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Correspondence concerning subscription, back issues, publication, etc. should be addressed
to the editor: **Hisham K. El-Hennawy**

Postal address: **41, El-Manteqa El-Rabia St., Heliopolis, Cairo 11341, Egypt.**

E-mail: el_hennawy@hotmail.com Webpage: <http://serket2008.multiply.com>

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**Prey-capture behaviour of the Egyptian scorpion
Scorpio maurus palmatus (Ehrenberg, 1828)
(Scorpiones: Scorpionidae)**

Moustafa M.H. Sarhan¹, Ahmed B. Sayed², Mohsen A. Mostafa¹
& Ahmed E. Yasin³

¹ Zoology Dept., Faculty of Science, Al Azhar University, Assiut, Egypt

² Zoology Dept., Faculty of Science, Al Azhar University, Cairo, Egypt

³ Faculty of Education, Suez Canal University, Al Arish, Egypt

Abstract

The scorpion *Scorpio maurus palmatus*, a desert dwelling burrower (Family Scorpionidae) is common in the North African and Middle East countries. In Egypt, it is recorded from Wadi Natrun, Cairo, Faiyum, Western Mediterranean Coastal Desert, Southern & Central Sinai, and Elba protected area. Despite of its wide distribution, little is known about its behavioural aspects. In this study, prey-capture by *Scorpio maurus palmatus* was observed in the laboratory. The behaviour components displayed in prey-capture were identified, compiled into a flow chart (ethogram), analyzed and discussed.

Keywords: Scorpions, *Scorpio maurus palmatus*, prey-capture behaviour.

Introduction

Scorpions are predatory arthropod animals, feeding on small arthropods. Scorpions are common and ecologically important arthropods in arid and semi-arid ecosystems throughout the world (Polis, 2001; Brown, 2004). They are among the most important predators in arid region communities in terms of density, biomass and diversity (Polis, 1990). Moreover, scorpions exert predatory pressure on a wide variety of insect and spider populations, having an impact in the flow of energy of these ecosystems (McCormick & Polis, 1990). Generally, scorpions have two types of prey-capture strategies: 1. most species hunt prey by the use of a sit and wait strategy, where prey is either located in the opening of the scorpion's burrow/hiding place or just outside it, 2. they actively hunt prey away from their hiding place (McCormick & Polis, 1990). Many previously published descriptions of the prey-capture behaviour have been observed in nature (Lankester, 1883; Fabre, 1911; Smith, 1927). The first publication that described

the prey-capture behaviour appeared by the end of 19th century (Pocock, 1893). Pocock described the feeding behaviour of two scorpion species *Parabuthus capensis* (Buthidae) and *Euscorpius carpathicus* (Euscorpiidae) and their reactions to common cockroaches. Several articles include brief descriptions of prey-capture for various scorpion species appeared (Vachon, 1953; Baerg, 1961; Cloudsley-Thompson, 1961; Williams, 1963; Stahnke, 1966). More detailed studies with the prey-capture behaviour for many scorpions were reported including flow charts (ethograms); *Heterometrus* spp. (Scorpionidae) (Palka & Babu, 1967), *Smeringurus mesaensis* (Vaejovidae) (Hadley & Williams, 1968; as *Paruroctonus*), *Hadrurus arizonensis* (Caraboctonidae) (Bub & Bowerman, 1979), African *Pandinus imperator* (Scorpionidae) (Casper, 1985), two buthid species from East Africa, *Parabuthus leiosoma* and *P. pallidus* (Rein, 1993, 2003), *Androctonus crassicauda* (Buthidae) (Stewart, 2006), and *Heterometrus petersii* (Jiao & Zhu, 2009).

The studied scorpion, *Scorpio maurus palmatus* (Ehrenberg, 1828) is recorded in north Egypt (near Alexandria, Wadi Natrun, Cairo, and Faiyum) (El-Hennawy, 1992), Northern and Central Sinai (Levy & Amitai, 1980) and Southern Sinai (Abdel-Nabi *et al.*, 2004). Recently, this species was recorded in Gabal Elba protected area (Sayed, 2013). It lives there among 7 buthid species (El-Hennawy, 2008; Sayed, 2013). Adult scorpions weight 2-3 gr and about 60 mm in length. It is found on brown sandy soils, loess and alluvial soils, and in stony desert. It burrows and can move stones heavier than itself. Each scorpion lives alone in a burrow, but as many as hundreds of burrows may be found in some areas (Abdel-Rahman *et al.*, 2009). The burrows have a crescent-shaped opening and run parallel to the ground for about 30 to 70 cm. The animals leave the burrow at night or stand at the entrance with the pincers slightly raised. This scorpion does not sting readily and the sting is not very painful to humans (Levy & Amitai, 1980). The most frequently captured preys are isopods, ants and beetles. Studies on *S. m. palmatus* life histories, however, are few in number. The lack of data is due in part to difficulties in rearing scorpions in captivity (Polis & Farley, 1979). Therefore, it is not surprising how little is known about behaviour and general biology of this species. This paper represents the first description of the prey-capture behaviour of the scorpion *S. m. palmatus* and its characterization.

Material and Methods

Ten individuals of the scorpion *Scorpio maurus palmatus* were collected from Western Mediterranean Coastal Desert, Alexandria, Egypt. Collected scorpions were kept and maintained individually in terraria (20cm x 20cm), with 5 cm deep sandy-soil substrate, which permitted them to burrow, in the room temperature ranged between 25°C and 30°C. Scorpions were provided every week by water and fed on insects especially crickets and cockroaches. Remains of dead preys were regularly removed from the containers. Scorpions were starved at least for three weeks before testing. During starvation period water was provided by misting. To investigate the prey-capture behaviour, the scorpion was removed with long forceps from its terrarium to cylindrical observation chamber (15 cm in diameter) and kept for 30 minutes to acclimate. After the acclimation period one adult American cockroach, *Periplaneta americana*, was dropped into the centre of the chamber as a prey for the tested scorpion. The scorpion behaviour was monitored and filmed with Panasonic HDC-TM70 video camera, and analyzed by Sony Vegas® Movie Studio 11.0 software. Data acquisition started at first recognition of prey item by the scorpion and finished upon ingestion.

The behavioural components involved in prey-capture of *S. m. palmatus* were identified and the corresponding ethogram was constructed. The following behavioural components were identified according to Bub & Bowerman (1979), Rein (2003) and Stewart (2006):

Active: walking in the chamber, prior to contact with the prey, the pedipalpal chela closed and opened.

Alert Stance: a posture in which the scorpion is supported above the substrate by the legs, the pedipalps are extended opened, with the movable fingers of the pedipalpal chelae and the pectines in contact with the substrate.

Orientation: movement of the scorpion directly towards the prey.

Grasp Attempt: the scorpion try to obtain a hold on the prey with the pedipalpal chelae.

Grasp Failure: the prey escapes after a grasp attempt.

Grasp Success: the scorpion obtains a firm hold on the prey by its pedipalpal chela.

Sting: a behavioural unit consisting of a forward sweep to the metasoma, telson contact with the prey, and aculeus penetration with presumed venom injection.

Inactive: after a grasp success; no detectable activity seen of chelicerae, pedipalps or walking appendages.

Manipulation: handling of the prey by the pedipalps and first pair of legs, including turning of the prey for head-first ingestion.

Cheliceral Activity: protraction of one chelicera and retraction of the other, alternating with retraction of the first and protraction of the other (chelicerae are opened during protraction and closed during retraction).

Sand Thrust: a pedipalp is pushed into the substrate, withdrawn, and frequently brushed off by the distal segments of the first and second pair of legs.

Travel: moving throughout the chamber, holding the prey in a pedipalp and/or chelicerae.

Ingestion: the intake of the pre-digested fluid prey, as indicated by cyclical movements of the coxae of the first legs.

Results

Prey-capture sequence

For studying the prey-capture behaviour in *S. m. palmatus*, the scorpion was placed in the observation chamber and kept for 30 minutes to acclimate. During the acclimation period, the scorpion walked around the area in an exploratory behaviour with its pedipalpal chela opened and closed. After the acclimation period, the prey (*P. americana*) was dropped into the centre of the observation chamber. Once the prey was detected, 83% of the investigated scorpions adopted alert stance (Fig. 1a) with the pedipalpal chela opened, extending interiorly, and slightly bowed. The scorpion in alert stance was able to induce orientation by moving towards prey to make a grasp attempt (Fig. 1b). On most instances, the scorpion still in alert stance with a few centimetres from the prey, waiting for the prey first move, then the scorpion successfully grasps the prey (Fig. 1c). When the scorpion moved before, the prey would be able to avoid the scorpion grasp. The frequency of the first grasp success was low 4%. The second time of grasp success was estimated as 75%, or it paid no further attention to the prey. Prey resistance to capture was often observed. After a successful grasp, scorpions caught the prey with both pedipalps and then pulled the prey. At the same time, the first pair of legs supported the scorpion to handle the prey. The second, third and fourth pairs of legs extended to

maintain stability. After successful grasp, scorpions used their venom apparatus to sting the prey with several successive stings in different positions depending on the prey resistance. Some scorpions stung three times in three different sites; first the cockroach was stung in the latero-ventral side of the abdomen, followed by the thorax and finally in the first leg (Fig. 1d–f).

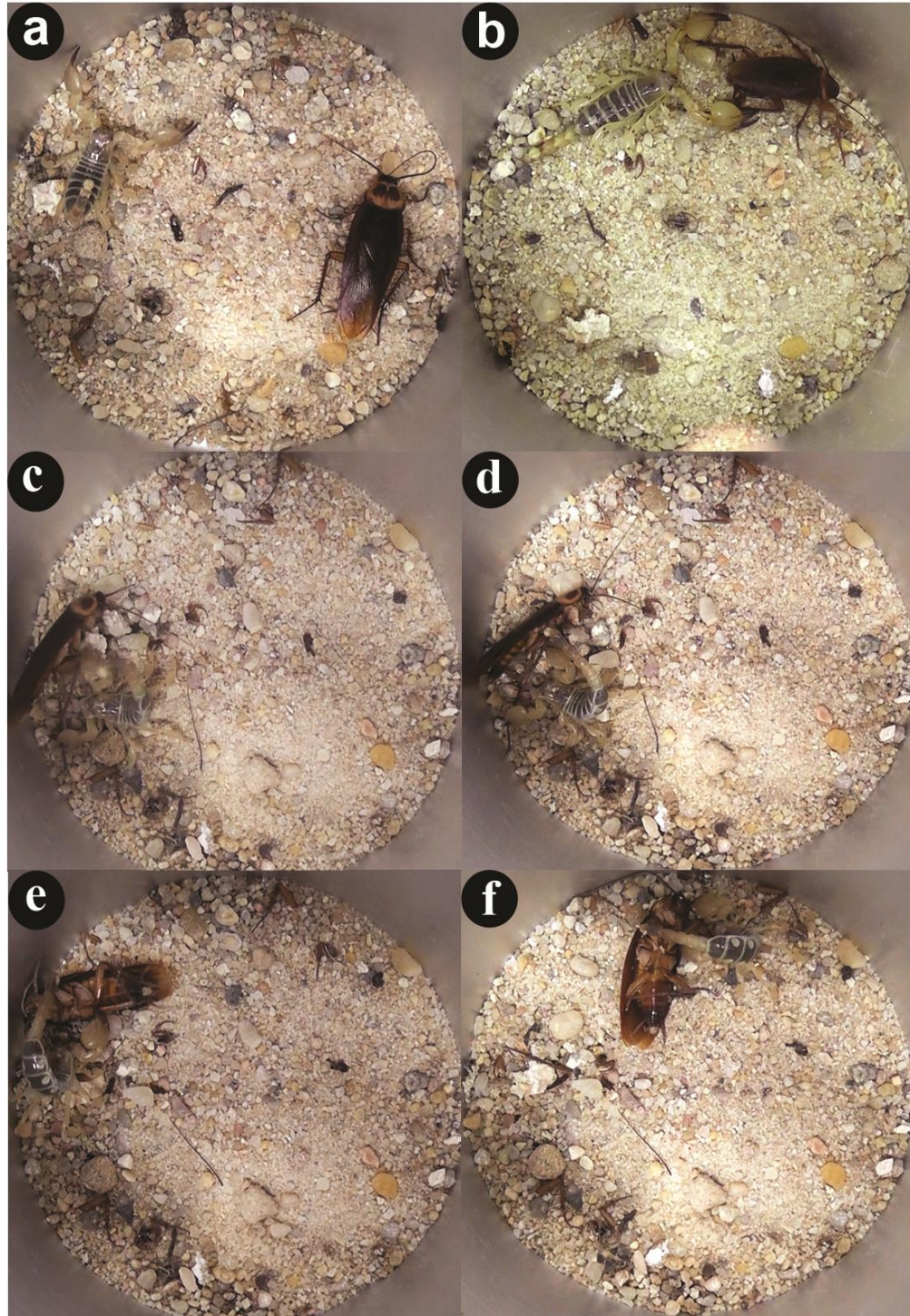


Fig. 1a–f. Prey-capture behavioural units of *Scorpio maurus palmatus*: a. Alert stance, b. Grasp attempt, c. Grasp success, d. Sting use in abdomen, e. Sting in thorax, f. Sting in the first leg.

After the sting behaviour, 60% *S. m. palmatus* held the prey with both pedipalps and stayed without any detectable activity, the body of the scorpion and the metasoma is in contact with the substrate, this behaviour is called the "inactive" (Fig. 1g). After the inactive behaviour the scorpion handled the prey by the pedipalps chela and the first pair of legs and oriented it for head first ingestion, this is called "manipulation" (Fig. 1k).

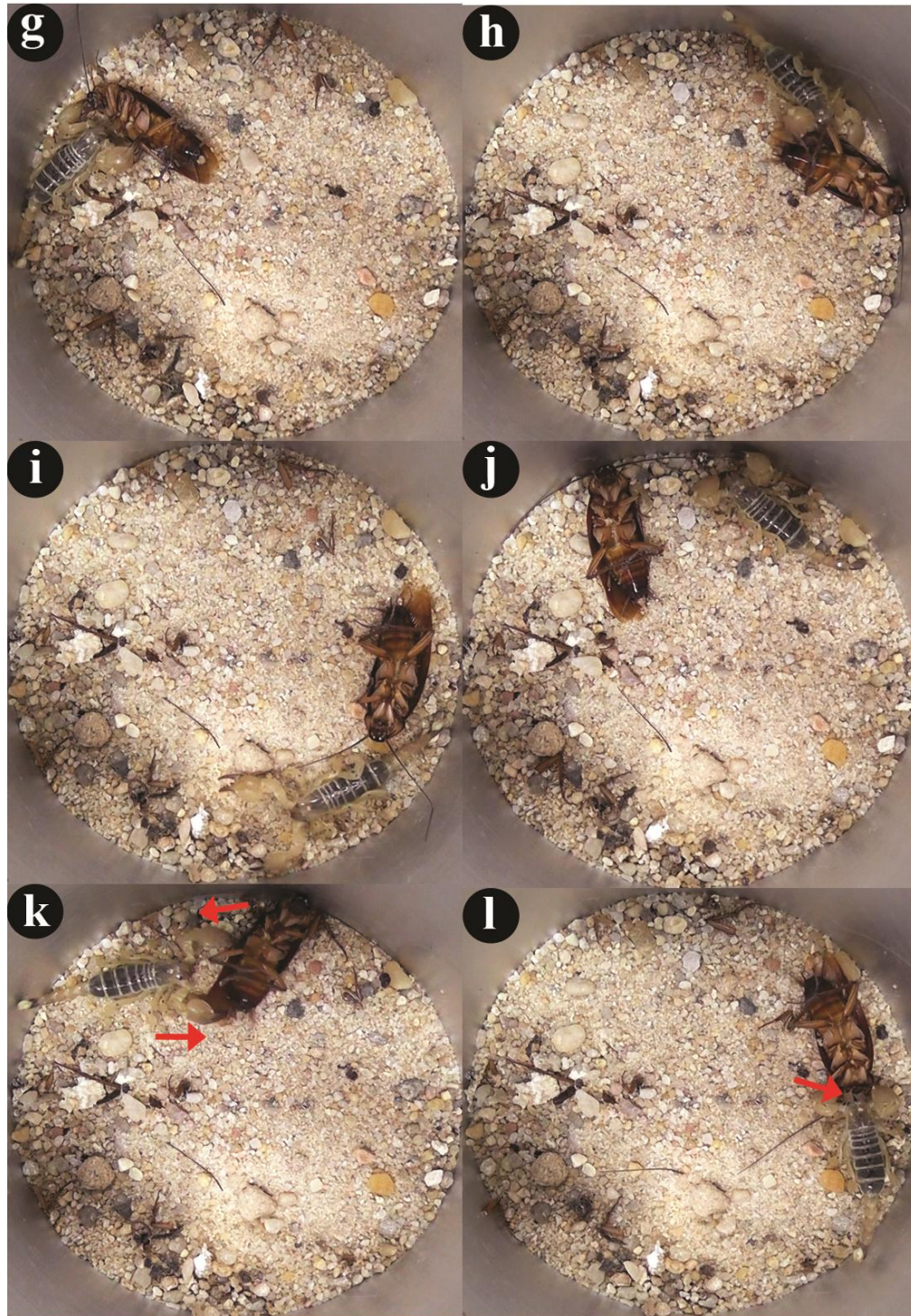


Fig. 1g–l. Prey-capture behavioural units of *Scorpio maurus palmatus*: g. Inactive, h. Travel with prey, i. Travel without prey, j. Sand thrust, k. Manipulation, l. Cheliceral activity.

S. m. palmatus showed two types of travel, the first one is walking around the observation chamber holding the prey by one pedipalpal chela (Fig. 1h). In the second type of travel, the scorpion left the prey and walked alone around the observation chamber (Fig. 1i). In most instances, after the first type of travel, the scorpion pushed the substrate by its pedipalps, withdrawn, and frequently brushed or cleaned its pedipalpal chela between chelicerae in a behaviour called "sand thrust" which is a unit of cleaning behaviour (Fig. 1j). The second type of travel observed after the sand thrust (estimated at 80%), the scorpion walked around the observation chamber without prey for several times and returned directly to the prey. Following that the *S. m. palmatus* started protraction and retraction of both chelicerae, the alternative protraction of one chelicera and retraction of the second. Observations on the prey-capture sequences were terminated when the alternative chelicera activity signalled that ingestion had commenced (Fig. 1). Notably, any behavioural unit followed the sting maybe followed by any others as shown in the ethogram (Fig. 2). For example, sting behaviour can be followed by travel, manipulation, inactive, sand thrust or cheliceral activity.

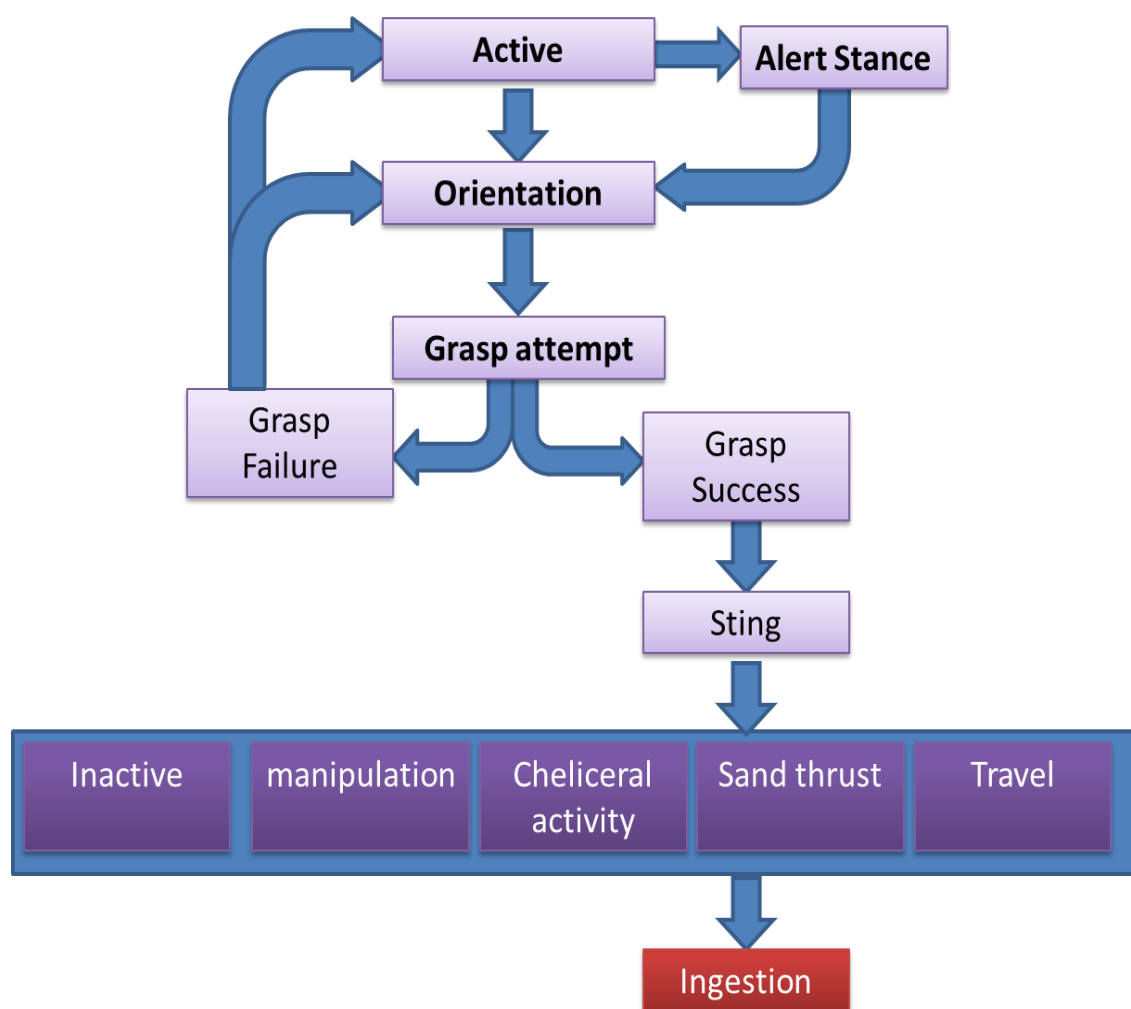


Fig. 2. Ethogram of the prey-capture behaviour sequence and its constituent behavioural units for the scorpion *Scorpio maurus palmatus*. Individual terms are defined in the text. Arrows indicate the direction of the prey-capture sequence. The framing of the behavioural components inactive, manipulation, cheliceral activity and travel refers to any of these behaviours observed either prior to, or after any of the others.

Discussion

Before starting the experiment for prey-capture, each scorpion was first placed in the observation chamber alone for acclimation. During this period, the scorpion walked with pedipalps outstretched in front of it, and the movable fingers of the pedipalpal chela closed or opened and pectines in contact with the substrate and the metasoma was curved above the scorpion's back or the pedipalps in the same plane of the scorpion's body. The stereotyped placement of these appendages in this behaviour may be critical in permitting central nervous system integration of environmental information concerning prey location (Murphy, 1971). Scorpions detect their prey with the help of substrate vibrations and some species can detect prey up to a distance of 50 cm (Brownell, 1977; Brownell & Farley, 1979). When the prey was placed in the centre of the observation chamber, all scorpions detected the presence of the prey immediately and oriented directly towards the prey. An explanation for the fast detection of the prey, that hungry scorpion had quicker responses and was more aggressive than satiated individuals (Stahnke, 1966). After a successful grasp, *S. m. palmatus* used venom apparatus to sting the prey. We noticed that scorpions stung several times at different sites of the prey. Consecutive stings were also observed during prey-capture in other Egyptian buthid scorpions such as *Leiurus quinquestriatus*, *Androctonus amoreuxi* and *Parabuthus leiosoma* (Elbitar *et al.*, 2012). On contrast, *Euscorpius italicus* (Euscorpiidae) and *Anuroctonus phaiodactylus* (Chactidae) seldom, if ever, employ a sting during prey-capture (Schultz, 1927; Cloudsley-Thompson, 1955; Baerg, 1961; Williams, 1963; McDaniel, 1968). It was pointed out that scorpions with large pedipalps and reduced metasoma probably do not use the sting for immobilizing prey (Baerg, 1961). It seems that this is not the case in *S. m. palmatus* as it was noted to sting the prey during all observed captures. Variation of sting use among different scorpions was reported; *Hadrurus arizonensis* stung every prey offered. *Buthus occitanus* sting was frequently employed to subdue struggling insects (Fabre, 1923). *Urodacus manicatus* (Scorpionidae) invariably stings its prey as soon as it is captured (Southcott, 1955). Interestingly, young scorpions of the African *Pandinus imperator* usually use sting for prey subdual while adult scorpions refused to utilize the sting in prey subdual, apparently rejecting prey too large to subdue with the pedipalps alone (Casper, 1985). Such variation of sting styles may refer to the size of scorpion in relation to the captured prey. In our case, we used only adult cockroaches with the same or larger size than tested scorpion. Thus, the adult cockroaches may resist the scorpion too hard which renders the scorpion to use sting several times. Moreover, mapping of predatory digger wasp sting sites on cricket prey correlated with the location of major ganglia (Steiner, 1976) but it appears that no such correlation in the sting sites of *S. m. palmatus* on cockroach prey. Rather, the sting site distribution appears to reflect the sites of the first penetrable tissue encountered. Adult cockroaches received stings on their ventral surface, even though the dorsal surface was usually encountered first by the telson. The heavy wings and thoracic sclerites appear to prevent dorsal penetration. The first sting in the thorax causes a transient front leg paralysis lasting for few minutes. Following the head sting, the venom represses the activity of head ganglia neurons. Variation in venom composition has been documented for successive stings by scorpions (Yahel-Niv & Zlotkin, 1979; Inceoglu *et al.*, 2001; Elbitar *et al.*, 2012). This indicates that similar mechanisms may work in scorpion venom to subdue captured prey. It will be interesting to find out the venom components and their corresponding molecular targets that are involved in behavioural modifications. With the available tools of biochemical and molecular biology techniques, it may be possible to characterize the biochemical

composition of *S. m. palmatus* venom and identify bioactive components by their introduction in vivo and in vitro into the cockroach's central nervous system.

S. m. palmatus was noted to be inactive after the sting behaviour. Similar inactivity was observed in *Paruroctonus boreus* (Vaejovidae), which stayed inactive for 10-30 minutes after rendering the prey harmless (Cushing & Matherne, 1980). Scorpions may stay inactive after prey-capture to let the venom work before starting ingestion or to avoid the effect of intake fresh injected venom from the prey. Following to inactivity, scorpions show travel behaviour. Two types of travel were observed in *S. m. palmatus*. Two similar types of travel behaviour were reported when studying prey-capture of *Parabuthus pallidus* (Rein, 2003). This type of combined travel behaviour is likely reasonable for scorpions that live most of time in burrows. The first type of travel, with prey, may aim to move prey into a more secure location such as the burrow. In this case the scorpion is safe and less vulnerable to predation. The second type of travel, without prey, may arise inside the burrow when scorpion needs to recover after encounters with hard struggling prey. This point awaits check in the field. In the present study, *S. m. palmatus* showed cleaning behaviour. This type of behaviour referred as sand thrust (Bub & Bowerman, 1979). The purpose of sand thrust is removing irritating substances from the pedipalps and/or metasoma which contains numerous hairs (setae). Many of these hairs are innervated and play an important role in the sensory system of scorpions (Brownell, 1977). It is possible that these sensory hairs are impaired if exposed to body fluid from injured prey and this might reduce sense capabilities or irritate the scorpion. *Heterometrus petersii* use leg claws as cleaning tools (Jiao & Zhu, 2009) but *S. m. palmatus* used sand of the substrate or the chelicera to clean its pedipalp. Thus, different types of cleaning behaviour could be related to scorpion habitats. Just before start feeding, *S. m. palmatus* handled the prey by the pedipalps chela and the first pair of legs and oriented it for head first ingestion. This behaviour is not an unusual among the arachnids and has been described in *Hadrurus arizonensis* (Bub & Bowerman, 1979) and *Opisthophthalmus latimanus* (Scorpionidae) (Alexander, 1972). These scorpions identified the position of the prey's legs as being one of the clues used for feeding orientation. Head first consumption may be used in subduing the prey by immediately damaging the brain. Chelicer activity behaviour was observed in the scorpions and usually occurred after manipulation. The reciprocate grasping and retraction by the two chelicerae slowly tears the prey's exoskeleton, exposing the inner tissues to the digestive enzymes of the scorpion (Snodgrass, 1948). Rhythmic movements of the coxae of the first pair of legs help in transporting the pre-digested prey into the scorpion's oral cavity by means of a pumping action (Shrivastava, 1955). Observations on the prey-capture sequences were terminated when the rhythmic movements of the coxae signalled that ingestion had started. The current study provides an informational foundation for further studies on the feeding behaviour of *S. m. palmatus* as well as for comparative studies of other species of scorpions that are closely and distantly related.

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New records for the spider fauna of Turkey (Araneae: Salticidae)

İlhan Coşar¹ & Tarık Danişman²

¹ University of Kırıkkale, Graduate School of Natural and Applied Sciences, Department of Biology, Kırıkkale, Turkey

² University of Kırıkkale, Faculty of Sciences and Arts, Department of Biology, Kırıkkale, Turkey

Abstract

Two salticid spider species, *Chalcoscirtus catherinae* Prószyński, 2000 and *Heliophanus curvidens* (O. P.-Cambridge, 1872) are recorded for the first time from Turkey. Their morphology is briefly described and illustrated.

Keywords: Araneae, Salticidae, *Chalcoscirtus catherinae*, *Heliophanus curvidens*, new record, Turkey.

Introduction

The Salticidae Blackwall, 1841 is the largest family of spiders with 5615 described species (Platnick, 2013). A total of 99 species in 36 genera are known in Turkey (Bayram *et. al.*, 2013) from Salticidae. In this paper, we add two jumping spider species to the spider fauna of Turkey. These species are *Chalcoscirtus catherinae* Prószyński, 2000 and *Heliophanus curvidens* (O. P.-Cambridge, 1872).

Material and Methods

This study is based on the material collected in 2012 from Şanlıurfa province of Turkey. Specimens were collected by means of hand aspirator from stony ground and preserved in 70% ethanol. The identification was made with Leica S8APO stereomicroscope. Identification depended on Prószyński (2000, 2003). Specimens were photographed and SEM photographs of male palps were taken by Jeol JSM 5600 Scanning Electron Microscope. Abbreviations used in the text are as follows: Cx: coxa, Tr: trochanter, Fe: femur, Pa: patella, Ti: tibia, Mt: metatarsus, Ta: tarsus. All measurements are given in millimetres. Specimens are deposited in the collection of the Arachnological Museum of Kırıkkale University (KUAM).

Results

Chalcoscirtus catherinae Prószyński, 2000

Material examined: 1♂, Şanlıurfa Province, Birecik District. (37°03'09"N, 38°07'02"E, 798m), 04.05.2012, from stony ground. Leg. T. Danişman.

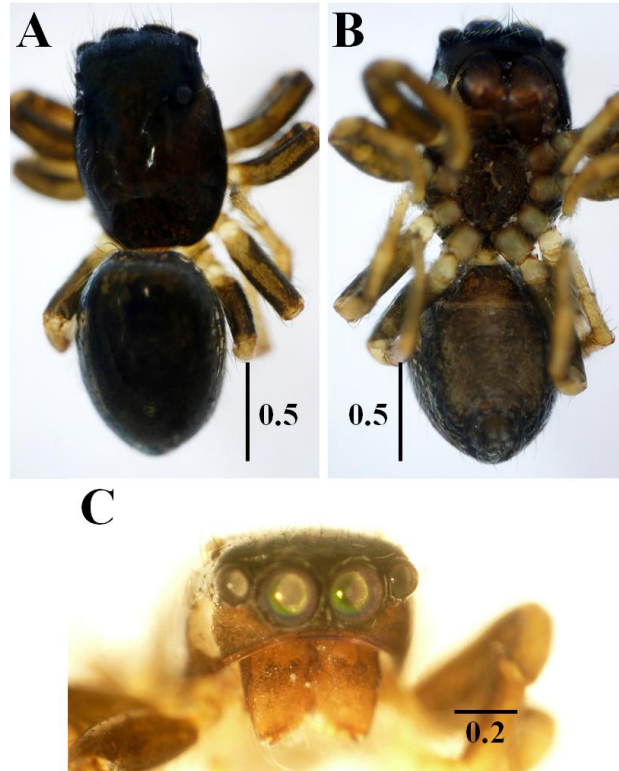


Fig. 1. *C. catherinae*, male. A. dorsal view. B. ventral view. C. ocular area, frontal view.

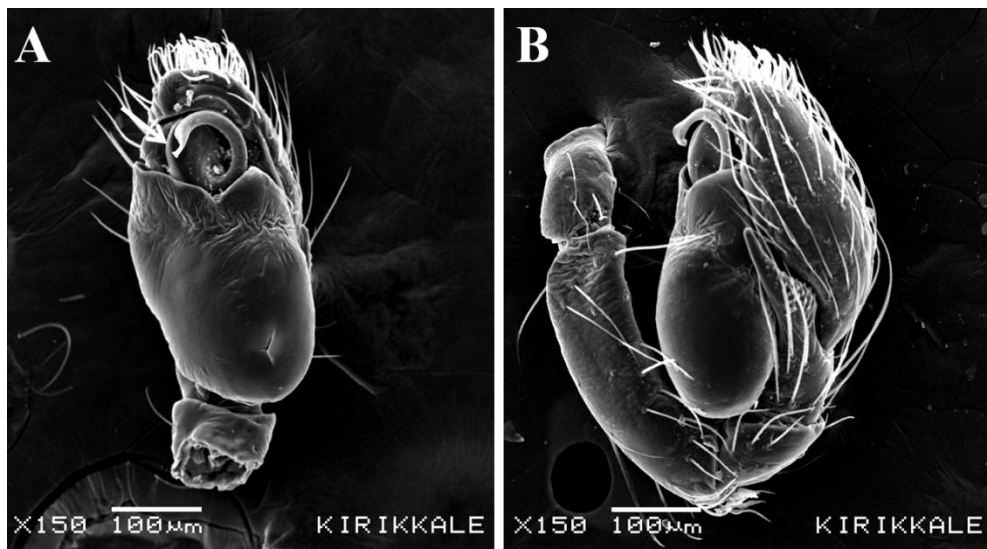


Fig. 2. *C. catherinae*, male pedipalp. A. ventral view. B. retrolateral view.

Morphology: Male. Total length: 2.0; prosoma length 1.05, width 0.80; opisthosoma length 0.95, width 0.70. Prosoma is dark brown and shiny that reflects the light. Anterior ocular area is black. There are few white hairs around anterior eyes. Sternum is dark brown. Abdomen is shiny black with scutum. All legs' femora are greyish-yellow and include brown spots, however other segments are yellow (Fig 1). Pedipalp's bulb is large, embolus is outwardly curled and ends with a slim part (Fig 2). Tibial apophysis curved, with ventral and dorsal sides serrated.

Leg formula: IV-III-I-II. Lengths of legs:

I leg. Cx: 0.15, Tr: 0.10, Fe: 0.47, Pa: 0.22, Ti: 0.32, Mt: 0.22, Ta: 0.20, Total: 1.68.

II leg. Cx: 0.12, Tr: 0.07, Fe: 0.45, Pa: 0.20, Ti: 0.27, Mt: 0.20, Ta: 0.17, Total: 1.48.

III leg. Cx: 0.15, Tr: 0.12, Fe: 0.50, Pa: 0.22, Ti: 0.30, Mt: 0.25, Ta: 0.22, Total: 1.76.

IV leg. Cx: 0.20, Tr: 0.10, Fe: 0.52, Pa: 0.22, Ti: 0.40, Mt: 0.32, Ta: 0.25, Total: 2.01.

Heliophanus curvidens (O. P.-Cambridge, 1872)

Material examined: 1♂, Şanlıurfa Province, Birecik District. (37°03'09"N, 38°07'02"E, 798m), 04.05.2012, from stony ground. Leg. İ. Coşar.

Morphology: Male. Total length: 2.90; prosoma length 1.50, width 1.10; opisthosoma length 1.40, width 1.05. Prosoma has bright hairs and black colour. Abdomen is black and its anterior part is covered with white hairs. Patterns formed by white hairs are present on the middle of the abdomen and close to spinnerets. Prosoma is black and hairy, chelicerae are dark brown and palps are black. Dorsal sides of palpal patella, tibia and cybium are covered with white hairs. A long femoral apophysis with slant end is found in palp. Ventral tibial apophysis is long, straight and its apical tip is inclined. Bulb is large with a triangle-shaped end piece extending toward the front close to embolus ventrally. While base part of embolus is large, its end is thin and slant. Femur, patella, and tibia have black and partly white hairs on all of the legs. Metatarsus and tarsus segments are light brown.

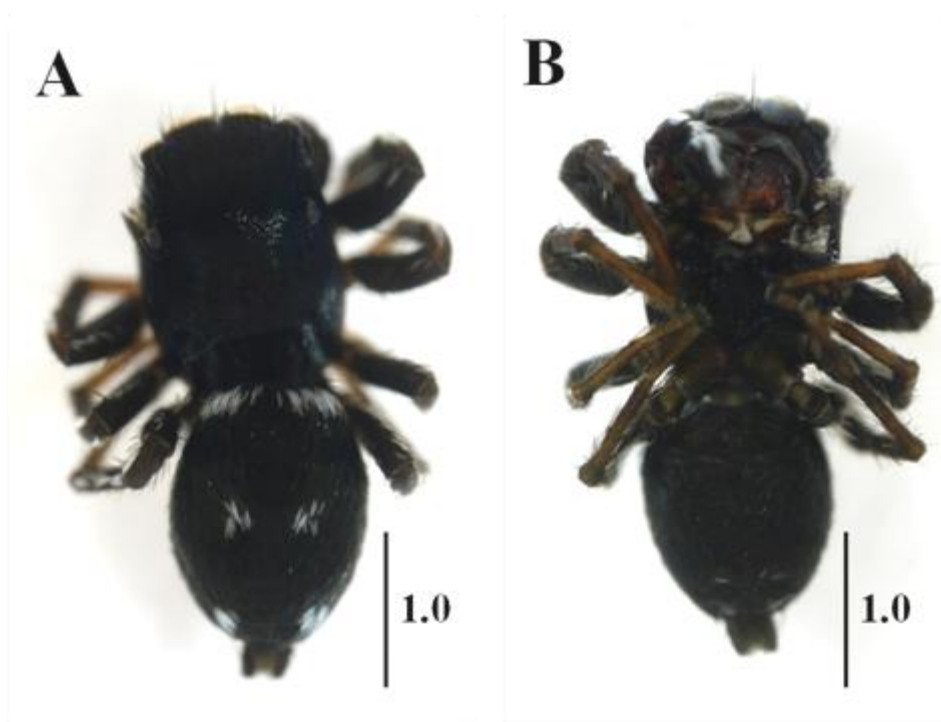


Fig. 3. *H. curvidens*, male. A. dorsal view. B. ventral view.

Leg formula: IV-I-III-II. Lengths of legs:

I leg. Cx: 0.30, Tr: 0.20, Fe: 0.80, Pa: 0.40, Ti: 0.55, Mt: 0.45, Ta: 0.35, Total: 3.05.

II leg. Cx: 0.25, Tr: 0.15, Fe: 0.70, Pa: 0.35, Ti: 0.50, Mt: 0.40, Ta: 0.35, Total: 2.70.

III leg. Cx: 0.25, Tr: 0.15, Fe: 0.75, Pa: 0.30, Ti: 0.50, Mt: 0.50, Ta: 0.35, Total: 2.80.

IV leg. Cx: 0.35, Tr: 0.15, Fe: 0.95, Pa: 0.35, Ti: 0.65, Mt: 0.65, Ta: 0.45, Total: 3.55.

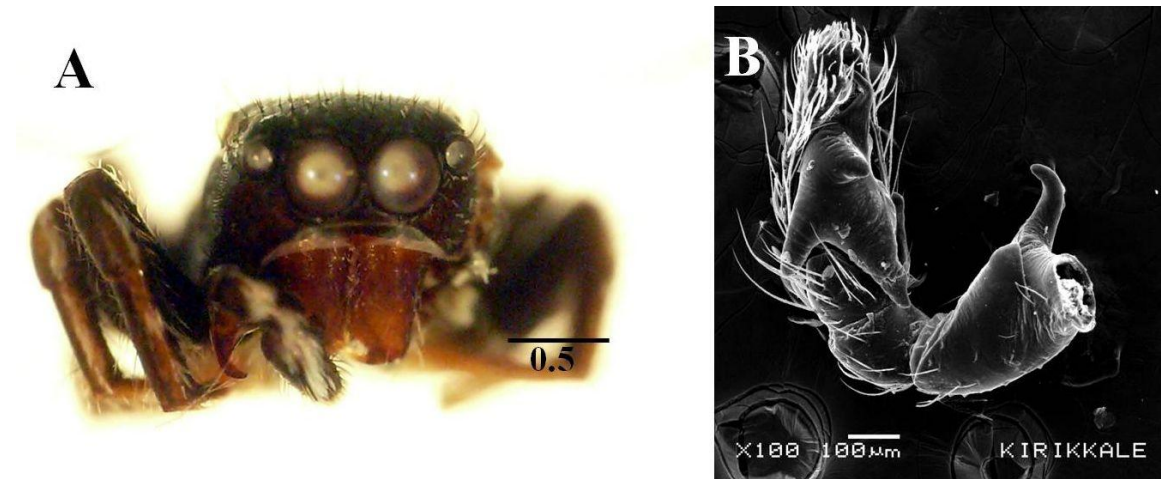


Fig. 4. *H. curvidens*, male. A. ocular area, frontal view. B. pedipalp, ventral view.

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A new oonopid spider record from Turkey (Araneae: Oonopidae)

Meryem Arslan¹, Tarık Danişman² & Kadir Boğaç Kunt³

¹ Kırıkkale University, Graduate School of Natural and Applied Sciences, Department of Biology, 71451, Yahşihan, Kırıkkale, TURKEY

² Kırıkkale University, Faculty of Science and Arts, Department of Biology, 71451, Yahşihan, Kırıkkale, TURKEY

³ Poligon Site 71/27-B TR-06810 Dodurga, Çayyolu, Ankara, TURKEY

Corresponding author e-mail address: meryemarslan1988@hotmail.com

Abstract

This short paper reports one oonopid species which is new for the Turkish araneo-fauna. The characteristic features and photographs of *Orchestina simoni* (Dalmat, 1916) are presented. The total number of oonopid species recorded from Turkey becomes now 5 species.

Keywords: Araneae, Oonopidae, Taxonomy, New record, Turkey.

Introduction

Oonopidae members are ecribellate, haplogyne and small sized (1-4 mm) spiders. These spiders can be distinguished from other haplogynes in having large and contiguous six eyes (eyes may be reduced or absent in some species), an abdomen with scutum. Oonopids have two tracheal spiracles near epigastric furrow, their tarsi with onychium bearing two claws. They are mostly yellowish to orange. Oonopidae family have a worldwide distribution and consist of 1135 species belonging to 93 genera (Platnick, 2013). The genus *Orchestina* was described by Simon in 1882. It includes 71 species all over the world. This paper deals with the characteristic features and distribution of *Orchestina simoni* (Dalmat, 1916) and adds a new oonopid species to the araneo-fauna of Turkey. The total number of oonopids recorded from Turkey becomes now 5 species (Bayram *et al.*, 2013).

Material and Methods

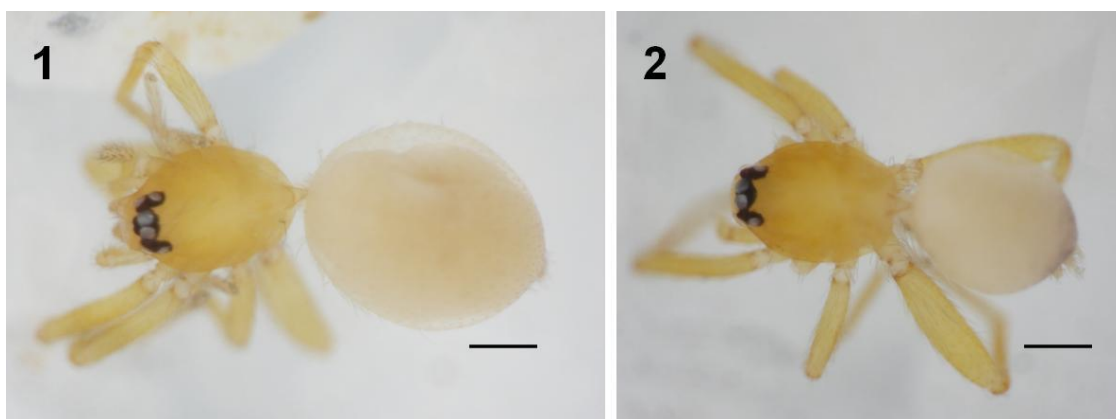
Specimens examined were collected from İzmir Province using hand aspirator from the ground and were directly taken into 70% ethanol. Species identification was

managed under Leica S8AP0 stereomicroscope. Chiefly well known identification keys were used for identification (Brignoli, 1967; Dalmás, 1916; Heimer & Nentwig, 1991; Le Peru, 2011). Specimens were photographed using a Leica DC160 camera attached to the microscope. Photographs were taken in dishes of different size with paraffin on the bottom. Different size holes were made in the bottom to keep specimens in the right position. Images were montaged using “CombineZM” image stacking software and “Photoshop CS5” image editing software. For SEM photographs, the male palps were dried at 30°C and coated with a thin layer of gold by Polaron SC 500 sputter coater, examined at an accelerating voltage of 15 kV under Jeol JSM 5600 Scanning Electron Microscope, and the electron micrographs were recorded. The specimens were deposited in the collection of the Arachnological Museum of Kırıkkale University (KUAM). All measurements are in millimetres.

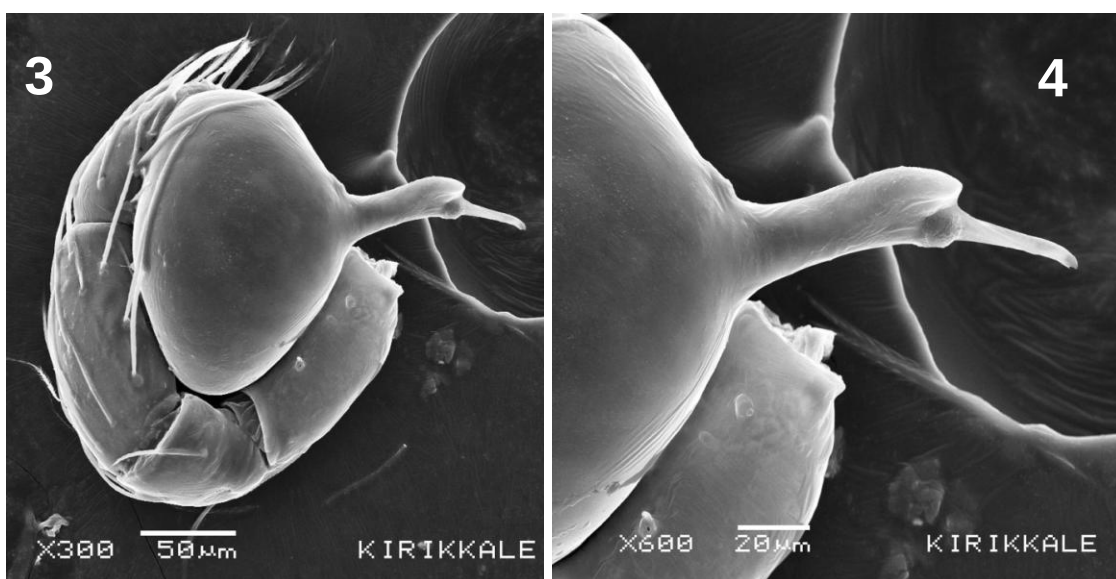
Results

Orchestina simoni (Dalmás, 1916) (Figs. 1-5)

Material examined: 1♀, 1♂, İzmir Province, Çandarlı (38°56'25.78"N, 26°55'3.68"E), 07.04.2012. leg. K.B. Kunt.



Figs. 1-2. *Orchestina simoni*, habitus. 1. female. 2. male. Scale line = 0.2 mm.



Figs. 3-4. *Orchestina simoni*, male. 3. pedipalpus. 4. psemboles. Scale line = 0.1 mm.

Description of male

Total length: 0.97; prosoma length 0.48, width 0.36; opisthosoma length 0.49, width 0.42. Prosoma is yellowish orange, smooth and bright (Fig. 2). Abdomen without scutum, pale with dark hairs, oval-shaped with dark terminal part. Legs are pale yellowish orange. Femur of fourth leg is thicker than other legs' femora. Bulb oval, psemبولus simple and cylindrical. Tip of psemبولus beak-shaped. Embolus sticks out an approximately half of psemبولus length (Figs. 3-4).

Description of female

Total length: 1.37, prosoma length 0.57, width 0.40; opisthosoma length 0.80, width 0.44. Colouration as in male (Fig. 1). Epigastric area without any external specializations. The female without scutum. Internal genitalia with concave and crescent-like structure. It has a short median column with simple and elliptical spermathecae. Spermathecae adjoined to the epigastric furrow (Fig. 5).

Distribution: France, Italy, Greece (Platnick, 2013).



Fig. 5. Epigastric area of female. Scale line = 0.1 mm.

With this study, the number of oonopid spiders in Turkey has increased to 5 species. The size of this species is smaller than European specimens (Le Peru, 2011).

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The effect of some new miticides on the spider mite *Tetranychus urticae* in water melon crop and their side effects on spiders (Araneae) at Fayoum governorate, Egypt

Marguerite A. Rizk, Mona M. Ghallab, Ayman Y. Zaki
& Bassem S. Wahba

Plant Protection Research Institute, A.R.C., Dokki, Giza, Egypt

Abstract

The efficiency of different groups of pesticides for suppressing the population of the two-spotted spider mite, *Tetranychus urticae* Koch, on water melon plants was studied. The pesticides include: I. three biochemical compounds: Yurmak 1.8% EC (Abamectin), Veto 5% EC (Abamectin), and Biofly 30x10³ WP (*Beauvaria bassiana*), II. three acaricides: Ortus 5% SC (Fenpyroximate), Acarots 5% EW (Fenpyroximate), and Prince 10% EC (Hexythiazox), and III. two mixture compounds: Nest 20% SC (Abamectin 2% + Spirodiclofen 18%) and Perfect 12% EW (Abamectin 2% + Chlorfenapyr 10%). They were applied for one time to control *T. urticae* infesting water melon plants during the experiment period.

The different acaricides formulations were effective control of *T. urticae* at least two weeks after application. Abamectin (biochemical) was more effective in reducing *T. urticae* population than spiders and with less effect against associated predators, while Hexythiazox was the most harmful acaricide in reducing spider populations. The results will be used to develop IPM Programs with spiders in agricultural crops.

Keywords: Abamectin, acaricide, *Beauvaria bassiana*, Chlorfenapyr, Hexythiazox, Fenpyroximate, miticide, *Tetranychus urticae*, spiders.

Introduction

The Integrated Pest Management (IPM) which is based on selective toxicity of the phytophagous mites and harmless to natural enemies became the most relevant strategy of plant protection (Leake, 2000). Several acaricides including Flufenoxuron,

Fenpyroximate and Abamectin are currently used in Egypt. However, the side effects of the acaricides to natural enemies are unidentified.

The two spotted spider mite, *Tetranychus urticae* Koch (TSSM) is one of the most important pests with a wide range of host plants and world distribution (Bolland *et al.*, 1998). Many efforts have been undertaken to manage TSSM problems in agricultural crops such as the application of new acaricides with low concentrations to save predator mites and spiders. Failure of chemical control to TSSM caused by resistance has been reported in several countries for compounds such as Hexythiazox (Herron & Rophail, 1993), Fenpyroximate (Sato *et al.*, 2004) and Abamectin (Beers *et al.*, 1998).

Also, some previous studies have examined the effects of some acaricides on non target soil fauna and beneficial species such as spiders (Amalin *et al.*, 2000; Kim & Yoo, 2002; Rizk *et al.*, 2005). Ahn *et al.* (2004) found that miticides were more toxic to TSSM than to its predator, *Phytoseiulus persimilis*.

In the present study, the effect of eight acaricides frequently employed in Egypt to control TSSM such as Abamectin, Fenpyroximate, Hexythiazox and *Beauvaria bassiana* product and their harmful effect on population density of spiders in water melon crops using topical applications and time exposure of pests. The acaricide concentration tested initially approximated field rates as recommended in 2012 by Agricultural Research Center (A.R.C.), Ministry of Agriculture.

Material and Methods

The study area

The experiment was conducted in Fayoum Governorate, Egypt in 2012. Water melon plant was sown in 1st June in an area of 2100 m² divided into 36 equal plots, each of ~58 m² that received 8 acaricides of four replicates for each treatment and a control. Plots were distributed in a randomized block design. Synthetic acaricide treatments were initiated based upon state recommendation. The evaluated acaricides rates and order of spray in treatments were as follow:

Trade name	Active ingredient	Rate / 100 L.	Type
Biofly 30x10 ⁻³ WP	<i>Beauvaria bassiana</i>	250 cc	Biochemical
Yurmak 1.8% EC	Abamectin	50 cc	Biochemical
Veto 5% EC	Abamectin	15 cc	Biochemical
Ortus 5% SC	Fenpyroximate	50 cc	Acaricide
Acarots 5% EW	Fenpyroximate	50 cc	Acaricide
Prince 10% EC	Hexythiazox	20 cc	Acaricide
Nest 20% SC	Abamectin 2% + Spirodiclofen 18%	20 cc	Mixture
Perfect 12% EW	Abamectin 2% + Chlorfenapyr 10%	30 cc	Mixture

Pest assessment

Sprays were applied for the tested compounds in 11 July. Pre-treatment count was recorded before spraying for each treatment. Ten leaves were randomly collected from each plot (replicate) and movable stages of spider mites were counted in 1 inch² area before spraying and after one day, 3 days, 7 days, 14 days, and 21 days. Percentage of reduction was calculated according to Henderson & Tilton (1955):

$$\text{Percentage of reduction} = \left[1 - \frac{T_a \times C_b}{T_b \times C_a} \right] \times 100$$

Ca: number after treatment in check plot. Cb: number before treatment in check plot.

Ta: number after treatment in treated plot. Tb: number before treatment in treated plot.

Survey of spiders in water melon fields

To evaluate the side effects of these synthetic acaricides on spider population, samples of spider fauna were collected weekly by pit-fall trap method as described by Southwood (1978) and Slingsby & Cook (1986). Forty five traps were placed in the water melon fields according to the arrangement of acaricides used.

Frequency and abundance values

The frequency values of the most abundant species were classified into three classes according to the system adopted by Weis Fogh (1948); "Constant species" more than 50% of the samples, "accessory species" 25-50% of the samples and "accidental species" less than 25%. On the other hand, the classification of dominance values were done according to Weigmann's system (1973) in which the species were divided into five groups based on the values of dominance in the sample; eudominant species (> 30% individuals), dominant species (10-30% individuals), subdominant (5-10% individuals) resident species (1-5% individuals) and sub resident species (1% individuals).

Species diversity

The biodiversity of ground spiders collected were estimated by using equilibrium. Diversity of collected spiders was determined for samples pooled over one summer season by a lot of different acaricides used to control spider mite. It was measured in each tested acaricide plots by diversity index that reflected the number of species (richness) in the samples. Two common indices were computed, Shannon-Wiener index "H" and Simpson index "S". They were calculated as described by Ludwig & Reynolds (1988). $H' = -\sum (n_i / n) \ln (n_i / n)$ and $S = \sum (n_i / n)^2$ where n_i is the number of individuals belonging to the i^{th} of "S" taxa in the sample and "n" is the total number of individuals in the sample. "H" is more sensitive to changes in number of species and diversity, while "S" is more responsive to changes in the most dominant species (Ludwig & Reynolds 1988).

Results and Discussion

The effect of tested compounds against *T. urticae* population

Data in Table (1) show the effects of acaricides on spider mite populations. All the compounds tested significantly reduced spider mite counts on water melon plants compared with the untreated check. Regarding the initial effect (one day after spraying), the chemical acaricide, Prince 10% EC (Hexithiazox) was more effective in controlling the spider mite mobile stages than other compounds resulting in 96.28% reduction followed by the mixture compounds, Perfect (90.93%) and Nest (89.12%), while the lowest reduction percent of spider mite mobile stages count 50.36% and 61.46% occurred from the acaricide, Ortus (applied at 50cc/100L H₂O) and the biochemical compound Yurmak (applied at 50cc/100L H₂O), respectively, being insignificantly with the remaining compound treatments and significantly with the control check.

Table 1. Effects of tested materials against spider mite *Tetranychus urticae* in water melon crops, 2012 (LSD at 5% = 8.2).

Acaricides	Pretreatment count / leaf	Initial effect after 1 day	% R	Post treatment count / leaf (Residual effect)				Total	Mean	% R
				3 days	7 days	14 days	21 days			
Biofly	15.6	2.4	88.84	2.8	7.6	8.8	15.6	34.8	8.7	85.50
Yurmak	12.8	6.8	61.46	3.2	0.8	1.6	2.4	8.0	2.0	95.90
Veto	8.0	2.4	78.24	3.8	2.4	2.4	7.2	15.8	3.95	87.13
Nest	16.0	2.4	89.12	1.6	0.2	0.4	1.1	3.3	0.83	98.70
Perfect	16.0	2.0	90.93	0.3	0.4	0.8	4.0	5.5	1.38	97.75
Ortus	7.6	5.2	50.36	0.2	1.2	0.8	2.8	5.0	1.25	95.70
Acarots	12.0	2.0	87.91	0.3	0.4	0.6	3.2	4.5	1.13	97.55
Prince	15.6	0.8	96.28	1.6	0.8	10.4	4.8	17.6	4.4	92.65
Control	14.8	20.4	-----	22.0	59.2	62.0	84	227.2	56.8	-----

R = reduction

After 3, 7, 14 and 21 days of spray, the reduction percentages of spider mite increased with the time elapsed after treatment. All the tested compounds significantly reduced the spider mite counts compared with the untreated check except of plot treated with Biofly (*Beauvaria bassiana*), the efficacy of the compound decreased in reduction percentage from 88.84% to 85.50% which indicates that Biofly caused spider mite populations rebound. This may be due to some abiotic factors.

Moreover, the mean counts of reduction percentage of the tested compounds throughout 3, 7, 14 and 21 days recorded that both mixture compounds Nest 20% SC (Abamectin 2% + Spirodiclofen 18%) and Perfect 12% EW (Abamectin 2% + Chlorfenapyr 10%) showed the highest reduction 98.70 and 97.75%, respectively, compared to other compound treatments; followed by the acaricide Acarots (97.55%) being significant with untreated check and insignificant with other compounds. While the biochemical compounds Biofly and Veto gave the lowest mean percentage of reduction (85.50 and 87.13%), respectively, being significant with untreated check and insignificant with other compounds.

The remaining compounds Yurmak (biochemical), Ortus and Prince (chemicals acaricide) took intermediate efficacies by causing 95.90, 95.70 and 92.65% reduction, respectively; the differences between means were insignificant.

Spider assemblages

As shown in Table (2), a total of 377 spiders were collected during the experiments; they belonged to 8 families, 11 genera and 12 species. Juveniles comprised 46.7% while males and females were 53.3%. The sex ratio was 1 ♀: 3.4 ♂.

The highest percent of their occurrence was presented by *Wadicosa fidelis* (166 individuals), *Hogna ferox* (64), *Pardosa* sp.₁ (52) and *Pardosa* sp.₂ (38), all of family Lycosidae; Rizk *et al.* (2004) indicated that the Lycosidae are more frequent in pitfall traps and showing a certain degree of resistance to acaricides. Family Salticidae was

represented by 2 genera (*Phlegra flavipes* and *Pellenes* sp.). Members of the remaining families Philodromidae (*Philodromus* sp.), Miturgidae (*Cheiracanthium* sp.), Linyphiidae (*Prinerigone vagans*), Gnaphosidae (*Zelotes* sp.), Thomisidae (*Thomisus spinifer*), and Theridiidae (*Steatoda erigoniformis*) were represented in few numbers by only a single species for each of them.

Efficacy of tested compounds against spiders associated with *T. urticae*

Different applications influenced spider abundance. The effect of tested compounds against spiders associated with the spider mite *T. urticae* is presented in Table (2). Results showed that the acaricides Prince (Hexythiazox) and Acarots 5% EW (Fenpyroximate) were the most effective pesticides against predators whereas the total numbers of collected spiders were lower than other tested compounds, recorded 14 and 33 individuals, respectively. The results are consistent with results reported for Fenpyroximate by Abd-Elhady & Heikal (2011) who reported that the use of this compound in the field would probably result in severe reduction of the predator, *Phytoseilus persimilis*; while the lowest numbers in male, female and juvenile spiders found in plot treated with chemical compound Prince received 14 individuals belonged to 6 species and 4 families. Marris (1988) studied the toxicity of Hexythiazox on mite eggs and the larval stage, and reported, using microscopic examination of eggs treated with a lethal dose of Hexythiazox, that embryos reach an advanced stage of development before dying. Rizk *et al.* (2004) cited the danger of acaricides use on the biodiversity of the spider fauna.

The highest numbers of individuals (88) recorded in the plot treated with Nest (Abamectin + Spirodiclofen) included 8 species belonged to 5 families; decreased to 39 individuals in plot treated with Perfect (Abamectin + Chlorfenapyr) included 6 species and belonged to 4 families. These results agreed with Maeyer *et al.* (2002) who proved that Spirodiclofen provided excellent control of *Lepidosaphes ulmi* and showed no adverse effects on natural predators of pear Psylla (Anthocoridae). While the higher dose of Chlorfenapyr (125 g/ha) was at par in reducing the predatory population level to the tune of 31.13 as proved by Sarkar & Samanta (2010) and also he concluded that, Chlorfenapyr at 75g/ha was safe for the natural enemies in chilli eco-system. In this respect, we can record that Nest had the lowest toxic effect against predators associated with the spider mite *T. urticae* and it was the most toxic pesticide against the spider mite.

The microbial pesticides Biofly and Veto showed intermediate reduction percent of predator's population. This result is in agreement with the results of Sabra *et al.* (2005) who indicated that Biovar was moderately effective against *Thrips* but less effective against associated predators. Moreover, Gillespie (1986) proved that *Thrips tabaci* was susceptible to *Beauveria bassiana* which killed all treated insects within 4 days. Also, Riechert & Lockley (1984) indicated that pesticides not always seen as disruptive spider population.

Plots treated with the biochemical compounds, the Veto (Abamectin 15cc) had 61 individuals belonged to 8 genera and 6 families decreased to 7 genera and 4 families of 44 individuals in plot treated with Yurmak (Abamectin 50cc); Miranda *et al.* (2005) found that the predators, *Anthicus* sp., *Orius* sp., *Xylocopa* sp., and staphilynid populations were severely reduced by excessive pesticides, Abamectin and Chlorothalonil applications in water plant plantations.

Table 2. Effects of different acaricides on spiders collected by pitfall traps under Water-melon plants in Fayoum.

Families, genera & species	Biofly			Yurmac			Veto			Nest			Perfect			Ortus			Acarots			Prince		
	♂	♀	J	♂	♀	J	♂	♀	J	♂	♀	J	♂	♀	J	♂	♀	J	♂	♀	J	♂	♀	J
Lycosidae																								
<i>Wadicosa fidelis</i>	13	5	6	8	3	15	10	7	-	13	3	1	9	3	3	12	4	25	13	2	4	3	1	3
<i>Pardosa</i> sp. ₁	2	-	2	-	1	3	2	1	30	1	-	-	4	-	1	1	-	-	2	1	-	1	-	-
<i>Pardosa</i> sp. ₂	6	1	-	4	1	1	-	1	-	2	-	2	-	1	13	2	-	-	1	-	1	2	-	-
<i>Hogna ferox</i>	1	-	-	1	1	-	2	2	-	3	1	52	-	-	-	-	-	-	1	-	-	-	-	-
Philodromidae																								
<i>Philodromus</i> sp.	6	-	1	1	-	1	2	-	-	2	-	3	1	-	2	3	1	-	2	1	1	2	-	-
Linyphiidae																								
<i>Prinerigone vagans</i>	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Miturgidae																								
<i>Cheiracanthium</i> sp.	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gnaphosidae																								
<i>Zelotes</i> sp.	2	1	-	-	2	-	1	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Salticidae																								
<i>Phlegra flavipes</i>	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	-	-	2	-	-	1	-	-
<i>Pellenes</i> sp.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Thomisidae																								
<i>Thomisus spinifer</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1	-	-	1
Theridiidae																								
<i>Steatoda erigoniformis</i>	-	-	-	2	-	-	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Total	30	8	10	16	8	20	18	11	32	25	4	59	16	4	19	20	5	25	21	5	7	9	1	4
Grand Total	48			44			61			88			39			50			33			14		

In general, the chemical compounds Prince and Acarots had high toxic effect against the spider mite *T. urticae* and reduced spider population while the mixture compound Nest, the biochemical Veto and the acaricide Ortus showed the highest total number of individuals recorded 88, 61, and 50 individuals, respectively with lesser effectiveness against associated predators. Also, Rizk *et al.* (2005) concluded that applications of different synthetic acaricides affected to a great extent the functional trophic groups of soil fauna.

Frequency and abundance values

Table (3) showed the frequency and abundance values of the most abundant spiders. Family Lycosidae was considered constant according to the system adopted by Weis-Fogh (1948) under different applications in all plots and it was recorded by 75, 86.3, 90.2, 88.6, 87.2, 88, 75.8, and 71.4% in plots treated with Biofly, Yurmak, Veto, Nest, Perfect, Ortus, Acarots and Prince, respectively. *Wadicosa fidelis* was the most common member recorded as Eudominant in all treatments except of plots treated with Veto and Nest (recorded as dominant). Families Philodromidae, Linyphiidae, Miturgidae, Gnaphosidae, Salticidae, Thomisidae and Theridiidae were considered Accidental families under different applications in all plots.

These results agree Rizk *et al.* (2012) who indicated that members of Lycosidae were represented by three most common species, *Wadicosa fidelis*, *Pardosa injucunda* and *Pardosa* sp. and all their developmental stages were collected by pitfall traps below four examined plants (the Spearmint, Castor bean, Roselle and Red pepper). Also, Shuang-lin & Bo-ping (2006) indicated that Lycosidae was dominant family and occupied more than 60% of individual community.

Table 3. The dominance-frequency relationship of spider communities (2012).

Fam.	Biofly				Yurmac				Veto				Nest			
	Total	F.%	Freq.	Dom.	Total	F.%	Freq.	Dom.	Total	F.%	Freq.	Dom.	Total	F.%	Freq.	Dom.
A	36	75	C	E	38	86.3	C	E	55	90.2	C	E	78	88.6	C	E
B	7	14.6	A	D	2	4.5	A	R	2	3.3	A	R	5	5.7	A	Sd
C	1	2.1	A	R	-	-	-	-	1	1.6	A	R	-	-	-	-
D	1	2.1	A	R	-	-	-	-	-	-	-	-	-	-	-	-
E	3	6.3	A	Sd	2	4.5	A	R	1	1.6	A	R	1	1.1	A	R
F	-	-	-	-	-	-	-	-	1	1.6	A	R	2	2.3	A	R
G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
H	-	-	-	-	2	4.5	A	-	1	1.6	A	R	2	2.3	A	R
Total	48				44				61				88			
Fam.	Perfect				Ortus				Acarots				Prince			
	Total	F.%	Freq.	Dom.	Total	F.%	Freq.	Dom.	Total	F.%	Freq.	Dom.	Total	F.%	Freq.	Dom.
A	34	87.2	C	E	44	88	C	E	25	75.8	C	E	10	71.4	C	E
B	3	7.7	A	Sd	4	8	A	Sd	-	12.1	A	D	2	14.3	A	D
C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E	1	2.6	A	R	-	-	-	-	-	-	-	-	-	-	-	-
F	-	2.6	A	R	1	2	A	R	2	6.1	A	Sd	1	7.1	A	Sd
G	-	-	-	-	1	-	A	R	-	-	-	-	1	7.1	A	Sd
H	-	-	-	-	-	-	-	-	2	6.1	A	Sd	-	-	-	-
Total	39				50				33				14			

A : Lycosidae; B : Philodromidae; C : Linyphiidae; D : Miturgidae;

E : Gnaphosidae; F : Salticidae; G : Thomisidae; H : Theridiidae.

Frequency (abundance) (Weis-Fogh, 1948): > 50% = Constant (C);

25-50% = Accessory (Ac); < 25% = Accidental (A).

Dominance (Weigmann, 1973): > 30% = Eudominant (E); 10-30% = Dominant (D);

5-10% = Subdominant (Sd); 1-5% Resident (R); < 1% = Subresident (Sr).

Species diversity

The biodiversity of spiders in the eight plots treated by different acaricides is compared using Shannon Wiener "H'" and Simpson "S" Indices of diversity (Table 4). The cover plantation of water melon in different plots varied in their spider species richness; the plot treated with Nest recorded the highest population of total number 88 individuals (Table 2). Its ecosystem is made of 5 families, 7 genera and 8 species; followed by Veto recorded 61 individuals, belonging to 6 families, 8 genera and 8 species. While the plot treated by the acaricides Prince and Acarots recorded the least species richness of 14 and 33 individuals, respectively.

Table 4. Estimation of Shannon-Wiener and Simpson Indices of diversity in different cover cultivations.

Type of index	Biofly	Yurmak	Veto	Nest	Perfect	Ortus	Acarots	Prince
Shannon-Wiener Index	0.83	0.55	0.47	0.4	0.5	0.46	0.80	0.89
Simpson Index	0.59	0.75	0.82	0.79	0.77	0.78	0.59	0.5

The biodiversity index calculation indicates that Biofly, Acarots and Prince were the most diverse; the species richness of spiders in different families and their equitability (evenness) were higher.

According to Simpson Index which is a measure of dominance (responsive to changes for the most dominant species), it was found that Veto and Nest included the highest number of dominant species of values 0.82 and 0.79, respectively.

Conclusion

The relative toxicity of pesticides to pests, predators and immature stages of the predators should provide an adequate indication for selectivity of pesticides, which is essential for development of pest management programs (Jeppson *et al.*, 1975).

Results showed that treatments of acaricides had a higher rate of TSSM mortality when compared with non treated plot and also affected the activity density of spiders. TSSM numbers on plots treated with acaricides were significantly lower than plots treated with Biofly and control plot.

Among the acaricides evaluated, Prince (Hexythiazox) was harmless to spiders; Nadimi *et al.* (2008) indicated this result with *Phytoseiulus persimilis*; while the two products of Fenpyroximate (Acarots and Ortus) gave different effect on spiders, Acarots was more harmful to spiders than Ortus. Our results are consistent with results reported by Blumel & Hansdorf (2000) and Nadimi *et al.* (2008).

Also, spiders have responded differently to the two products of Abamectin. Abamectin efficacy against *T. urticae* varied. Results obtained had the reduction of spiders in plots treated with Yurmak more than that obtained from Veto, but the compound Nest (Abamectin + Spirodiclofen 18%) was harmless to spiders and might cause hatching of eggs to increase the total number of individuals. This result proved that Abamectin was moderately harmful to spiders. Nadimi *et al.* (2008) confirmed that Abamectin has a direct effect on survival and reproduction of the predator mites. Moreover, Lagziri & El-Amrani (2009) concluded that Abamectin appears to be remarkably good fit for strawberry mite management because of its strong efficacy, the persistence of control and its limited negative impact on important natural enemies.

Abamectin, Fenpyroximate and Biofly are very toxic. They should be used carefully and may be classified as IPM compatible acaricide in integrated pest management programs against *T. urticae* in Egypt.

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Preliminary list of Lebanese spiders and other arachnids (except ticks and mites)

Hisham K. El-Hennawy

41 El-Manteqa El-Rabia St., Heliopolis, Cairo 11341, Egypt

E-mail address: el_hennawy@hotmail.com

Abstract

Six orders of class Arachnida were recorded from Lebanon; in addition to Acari (ticks and mites are outside the scope of this work). They are: Araneae (38 Families, 109 genera, 165 species), Scorpiones (2 Families, 10 genera, 12 species), Pseudoscorpiones (7 Families, 8 genera, 10 species), Opiliones (3 Families, 8 genera, 10 species), Solifugae (1 Family, 1 genus, 2 species), and Palpigradi (1 Family, 1 genus, 2 species). The total is: 52 Families, 137 genera, 201 species. Each order section includes recorded taxa with their localities, list of species, keys to scorpion species and families of spiders and pseudoscorpions.

Keywords: Arachnida, Araneae, Scorpiones, Pseudoscorpiones, Opiliones, Solifugae, Palpigradi, Lebanon.

Introduction

Lebanon (10,452 km²), the home of the Phoenicians (c.1550–539 BC), the Switzerland of the East, attracted so many tourists and its capital, Beirut, was referred to as "the Paris of the Middle East". Lebanon has a moderate Mediterranean climate. In coastal areas, winters are generally cool and rainy whilst summers are hot and humid. In more elevated areas, temperatures usually drop below freezing during the winter with heavy snow cover that remains until early summer on the higher mountaintops. Although most of Lebanon receives a relatively large amount of rainfall, when measured annually in comparison to its arid surroundings, certain areas in north-eastern Lebanon receive little because of rain shadow created by the high peaks of the western mountain range. In ancient times, Lebanon was covered by large forests of cedar trees, the national emblem of the country. The forests cover 13.4% of the Lebanese land area (<http://en.wikipedia.org/wiki/Lebanon>).

Some of the tourists attracted to Lebanon collected arachnids. The available publications dealt with their specimens were consulted to prepare this preliminary list of

Lebanese spiders and other arachnids. Six orders of class Arachnida are recorded from Lebanon; in addition to Acari (ticks and mites are outside the scope of this work). Orders Amblypygi, Schizomida, Uropygi, and Ricinulei are not recorded yet, although a species of Amblypygi is recorded from adjacent and surrounding countries (El-Hennawy, 2002).

The six recorded arachnid orders are: Araneae, Scorpiones, Pseudoscorpiones, Opiliones, Solifugae, and Palpigradi. The numbers of recorded taxa are as follows:

Order	Families	Genera	Species
Araneae	38	109	165
Scorpiones	2	10	12
Pseudoscorpiones	7	8	10
Opiliones	3	8	10
Solifugae	1	1	2
Palpigradi	1	1	2
Total	52	137	201

Each order is dealt with in a separate section that includes recorded taxa with their localities, list of species, keys to scorpion species and families of spiders and pseudoscorpions. All the references are collected together. The authorship and date of publication of both Savigny and Audouin (1825) are according to El-Hennawy (2000).

The abbreviations used for collections mentioned in the text are:

HECO, HEC = Hope Entomological Collections, Oxford, U.K.

IRSNB = Institut Royal des Sciences Naturelles, Brussel, Belgium

IZPAN = Instytut Zoologii, Polska Akademia Nauk, Warsaw, Poland

MIZST = Museo ed Istituto di Zoologia Sistematica, Torino, Italy (MIZST: material of Festa defined by Pavesi).

MNHN, MNHP = Muséum National d'Histoire Naturelle, Paris, France

NHM = Museum of Natural History, London, U.K.

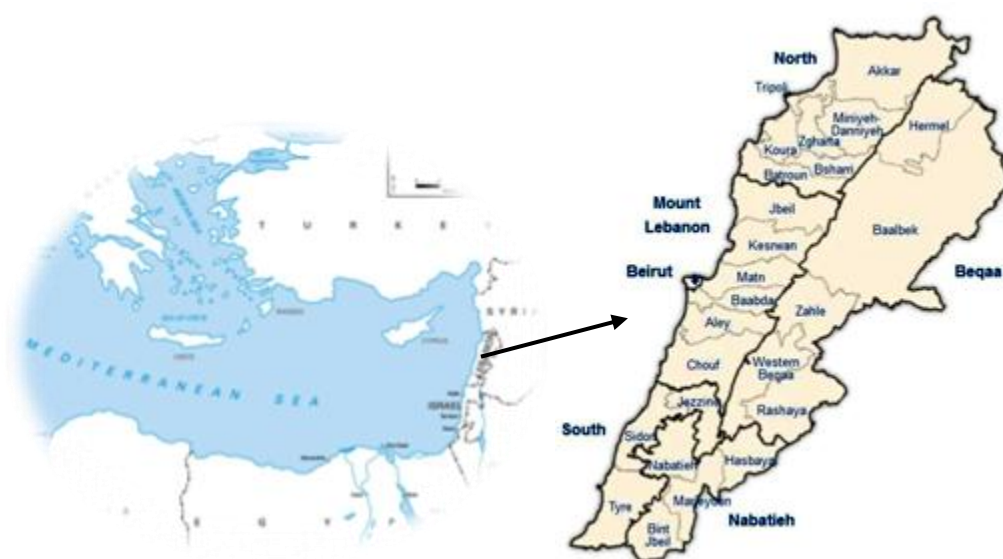
NMB = Naturhistorisches Museum Basel, Switzerland

NHMW, NMV, NMW = Naturhistorisches Museum Wien, Vienna, Austria

SMF = Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt am Main, Germany

ZISP = Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia

ZMB = Zoologisches Museum, Humboldt Universität, Berlin, Germany



Map of Lebanon and its districts.

I. Spiders of Lebanon

Ten years ago, David Penney described *Palaeomicromenneus lebanensis* gen. et sp. nov. (Araneae: Deinopidae) from Upper Neocomian–basal Lower Aptian (ca. 125–135 Ma) Cretaceous amber from the Hammana/Mdeyrij outcrop, Lebanon. This is the oldest known, and possibly the first true fossil, deinopid (Penney, 2003).

In the same year, Samuel Zschokke (2003) described the oldest spider silk in the world dates from the Early Cretaceous Period, more than 120 million years ago (about 127–132 Myr). The specimen was collected in 1969 from amber beds located near Jezzine in Lebanon and deposited in Staatliches Museum für Naturkunde in Stuttgart, Germany.

The extant spiders are poorly studied in Lebanon. The history of the previous studies is reviewed below:

The Reverend Octavius Pickard-Cambridge (1828-1917) visited Lebanon in May 1865 after a long visit to Palestine and Syria. His journey was on horseback "during a two-months' ride through the Holy Land, between the 16th of March and the 18th of May 1865" and his route began from Jaffa (Palestine), to Jerusalem, everywhere in Palestine, the plains of the Jordan, the adjacent part of Syria, then "from Banias by Hasbeiya and Rasheiya over the skirts of Mount Hermon to Damascus, from Damascus by the river Abana, Abila, Suk Wady Barada, and Surghaya to Baalbec and the Lebanon, and so to Beirut". He added: "I regretted much not being able to work the Lebanon district more thoroughly than the mere ride through some portion of it enabled me to do; just at the time of my visit to that part (middle of May) insect life was becoming abundant, and I do not doubt that among the Araneidea the number of species in the families *Theridiides* and *Epeirides* (some groups of both which families are but scantily represented in my collection) might have been greatly added to; the time and money, however, allotted to my eastern trip had come to an end; and I took leave of those most interesting regions with the greater regret" (Cambridge, 1872: 212-215). In spite of this, Pickard-Cambridge recorded 79 species of spiders of 28 families from Lebanon; 41 of them were described as new species and still bearing his name as an author. The majority of recorded species belong to: Salticidae (16), Gnaphosidae (8), Linyphiidae (7), Lycosidae (7), Theridiidae (5), Araneidae (4), and Zodariidae (4) (Cambridge, 1872). Also, he had interesting notes written in his diaries like this one: "May 18. (At Beyrout.) 'An old gentleman at dinner told the old story about a scorpion stinging itself to death when surrounded by a fire, but with this variation, that he put his scorpion under a tumbler, and hot coals all round outside. I don't believe a word of it, unless it was that the coals were so close to the tumbler that the scorpion was baked when there would be no necessity to sting itself to death. I ought to have tried it myself while in this country, but I detest such experiments.'" (Cambridge, 1918: 28). The work of Octavius Pickard-Cambridge (1872) is the first and the most important work on the spiders of Lebanon.

Eugène Simon (1873) described five species collected from Lebanon by the French entomologist M. Charles Piochard de la Brûlerie. Two of them were *Avicularia tetramera* and the new species *Avicularia striatocauda* which became synonyms of the theraphosid *Chaetopelma olivaceum*. The other three species were described as new species of Gnaphosidae and Agelenidae, transferred to other genera but still valid. They are: *Habronestes islamita* & *H. libani* (now in genus *Pax*) and *Tegenaria maronita* (now in genus *Malthonica*). Later, Simon described other spiders collected from Lebanon by De Brûlerie; the endemic liocranid species *Mesiotelus libanicus* (Simon, 1878a) and two new *Dysdera* species, one of them is still endemic, i.e. *D. dentichelis* (Simon, 1882).

Simon (1884), in his study of arachnids collected by M. l'abbé A. David from Smyrna,

Beirut and Akbès in 1883, described 31 species of 16 families (according to current classification) from Beirut: 7 Gnaphosidae, 4 Salticidae, 3 Agelenidae, 3 Lycosidae, 2 Segestriidae, 2 Zodariidae, and one species of each of Dysderidae, Miturgidae, Oxyopidae, Pholcidae, Selenopidae, Sicariidae, Sparassidae, Theraphosidae, Thomisidae, and Zoropsidae.

Pavesi (1895) studied arachnids collected by Dr. E. Festa from Palestine, Lebanon and adjacent regions and reported one agelenid and two araneids from Lebanon.

Kulczyński (1911) studied arachnids collected from Syria by Rev. P. Bovier-Lapierre and Palestine by Rev. E. Schmitz. From Lebanon, he recorded two species of Agelenidae, one of them as new species: *Maimuna bovierlapierrei*; the endemic species *Anyphaena syriaca* (Anyphaenidae); and one species of each of Linyphiidae, Salticidae, Thomisidae, Zodariidae, and Zoropsidae.

The French scientist Henri Gadeau de Kerville (1858-1940) visited Lebanon in 1908 and collected spiders and harvestmen with other animals and plants. His collection of spiders was listed in a paper published after 18 years (Kerville, 1926).

Jacques Denis (1955) described the spiders collected by the French entomologist Henri Coiffait (1907-1989) from Lebanon (1951). He described five endemic species; *Devade libanica* (Dictynidae), *Harpactea rugichelis* (Dysderidae), *Cataleptoneta edentula* (Leptonetidae), *Lepthyphantes speculae* and *L. vividus* (Linyphiidae) with other species which situations were discussed by Brignoli (1979) and Levy (1987).

Paolo Marcello Brignoli (1942-1986) published five important papers on Lebanese spiders: I. on the oonopid *Opopaea punctata* (Brignoli, 1975).

II. on *Holocnemus pluchei* with the description of the endemic *Pholcus maronita* as new species (Pholcidae) (Brignoli, 1977).

III. Notes on spiders of three families from Lebanon (Brignoli, 1978a): 1. Agelenidae: *Maimuna bovierlapierrei*, *Malthonica maronita*, *M. pagana*, and the endemic *Coelotes caudatus* with the description of *Tegenaria michae* as new endemic species named after his Lebanese wife, Micha. 2. Oxyopidae: *Oxyopes lineatus*. 3. Pisauridae: *Pisaura mirabilis*.

IV. on *Harpactea rugichelis* with the description of *Dasumia sancticedri* as new species, both are endemic dysderids from Lebanon (Brignoli, 1978b).

V. on *Hoplopholcus subterraneus* of pholcidae again (Brignoli, 1979).

De Blauwe (1973, 1980a, 1980b) recorded, in her studies of Mediterranean species, four agelenid species from Lebanon, one of them as new species; the endemic *Coelotes caudatus*.

Farkad Zaouk Assi, the first Lebanese araneologist, (1980 & 1982a) studied the biogeography, ecology and biology of *Agelena affinis* Kulczyński, 1911. Assi (1982b) studied *Opopaea punctata* (Oonopidae) of Lebanon. In 1986, Assi identified 20 species of Thomisidae and Philodromidae from five stations on the eastern and western slopes of Mont Lebanon. She recorded most of those species for the first time from Lebanon.

Gershom Levy (1977-2007) studied the spiders of the "*Fauna Palaestina*" and surrounding countries, including Lebanon in 19 papers and 2 books. His studies included species of families: Agelenidae, Anyphaenidae, Araneidae, Ctenidae, Cybaeidae, Gnaphosidae, Philodromidae, Pisauridae, Sparassidae, Theridiidae, Thomisidae, Zodariidae, Zoridae, and Zoropsidae. His works included many species from Lebanon.

Norman Platnick (1981) recorded the palpimanid *Palpimanus simoni* from Lebanon. In his catalog, he recorded the gnaphosid *Nomisia excerpta* and the salticid *Leptorchestes sikorskii* from Lebanon (Platnick, 2013).

Deeleman-Reinhold (1988) described the new species *Dysdera simoni* from Lebanon and recorded both *Dysdera dentichelis* and *D. spinicrus* too.

Gasparo (2003) described five species of genus *Dysdera* from Lebanon: *D. cristata*, *D. spinicrus*, *D. westringi*, *D. maronita*, and *D. vignai*. The two last species were described as new species to science.

Thaler *et al.* (2006) discussed the situation of *Zoropsis libanica* named but not described by Simon (1884). The species was later described by Levy (2007) as *Zoropsis thaleri*.

Bolzern *et al.* (2010, 2013) examined agelenid spiders from Lebanon and recorded *Eratigena atrica*, and three *Tegenaria* species.

Order Araneae Clerck, 1757

Family **Agelenidae** C.L. Koch, 1837

Genus **Agelena** Walckenaer, 1805

♂♀ **Agelena labyrinthica** (Clerck, 1757)

Agelena labyrinthica Cl., variété orientalis C. Koch - Simon, 1884: 86, Beirut.

♂♀ **Agelena orientalis** C.L. Koch, 1837

Agelena syriaca Koch - Cambridge, 1872: 273, on the Lebanon and at Beirut.

Agelena orientalis C.L. Koch, 1841 - Levy, 1996: 87, Lebanon: Beirut (O.P. Cambridge, 1872: 273, ♂ *syriaca*, not 2♀♀ = *afinis*; HECO, B.421, t. 10; Simon, 1884: 186; Pavesi, 1895: 6, 3 ♀♀ *syriaca*, also from Bukefeija, according to De Blauwe, 1980b: 18; Kerville, 1926: 68, from Brumana, Beit Meri).

Genus **Agelescape** Levy, 1996

♂♀ **Agelescape affinis** (Kulczyński, 1911)

Agelena affinis - de Blauwe, 1980b: 4, 5, Beyrouth (Liban).

Agelescape affinis (Kulczyński, 1911) comb. n. - Levy, 1996: 90, 91, *Agelena affinis* Kulczyński, 1911: 45, pl.2, fig. 53 ♀; Syntypes, 4 ♀♀ from Beirut, Lebanon (IZPAN).

♂♀ **Agelescape livida** (Simon, 1875)

Agelescape livida (Simon, 1875) comb. n. - Levy, 1996: 89, 90, probably in Lebanon. The biological studies of Assi (1980, 1982) in Lebanon probably refer to *livida* since *affinis*, seemingly, is confined to habitats of river banks, near running water.

? **Agelescape gideoni** Levy, 1996: 91, 92, presumably in Lebanon.

Genus **Coelotes** Blackwall, 1841

♀ **Coelotes caudatus** de Blauwe, 1973

Only in Lebanon

Coelotes caudatus n.sp. - de Blauwe, 1973: 31, f. 29, 1♀ holotype + 3♀♀ paratypes from Lebanon, without precise locality, in E. Simon's collection, MNHN t. 1.097. p.34. "Répartition géographique. – Liban (malheureusement, l'endroit précis de capture n'a pas été mentionné)."

Coelotes caudatus de Blauwe, 1973 - Brignoli, 1978a: 207, Bcharré - Col des Cèdres, 2300-2600 m, 31.V./3.VI.72, P. Brignoli leg., 2♀♀. - Cèdres de Bcharré, 1950 m, 3/5.VI.72, P. Brignoli leg., 3♀♀. Metn - Baskinta, 1400m, 22.V.72, P. Brignoli leg., 1♀.

Genus **Eratigena** Bolzern, Burckhardt & Hänggi, 2013

♂♀ **Eratigena atrica** (C.L. Koch, 1843)

Eratigena atrica (C.L. Koch, 1843) - Bolzern *et al.*, 2013: 749, Lebanon 1♀; p.760 "Additionally, there was a specimen from Lebanon in the collection at SMF, unfortunately with insufficient locality information written on the related label."

Genus *Lycosoides* Lucas, 1846

♂♀ *Lycosoides coarctata* (Dufour, 1831)

Textrix coarctata - de Blauwe, 1980a: 17, Liban.

Genus *Maimuna* Lehtinen, 1967

♂♀ *Maimuna bovierlapierrei* (Kulczyński, 1911)

Maimuna bovierlapierrei (Kulczyński, 1911) - Brignoli, 1978a: 207, Chouf - Beit ed Din, 900 m, 29/30.V.72, P. Brignoli leg., 4♀♀ Jazzine - Jazzine, 950m, 29.V.72, P. Brignoli leg., 1♀.

Textrix b. de Blauwe, 1980a: 3, f. 1-3 (♂♀), 4. *Textrix bovierlapierrei* Berytium, Liban.

Textrix libanica de Blauwe, 1980a: 51, Ain Zhalta, Liban.

Maimuna bovierlapierrei (Kulczyński, 1911) - Levy, 1996: 114, *Textrix bovierlapierrei* Kulczyński, 1911: 41, pl.1, figs 49 and 50, pl.2, fig. 52, ♂♀; syntypes ♂ + 2♀♀ from Lebanon: Beirut, leg. Rev. P. Bovier-Lapierre (IZPAN). *Textrix libanica* De Blauwe, 1980a: 49, figs 75 and 76, ♀; holotype ♀ from Lebanon: Ain Zhalta, leg. G. Fagel (IRSNB).

? *Maimuna meronis* Levy, 1996: 114, probably in Lebanon.

Genus *Malthonica* Simon, 1898

♂♀ *Malthonica maronita* (Simon, 1873)

Tegenaria maronita Simon, 1873: 141 (D♂♀).

Tegenaria annulipes O.P.-Cambridge, 1872: 275 (D♂♀; preoccupied by Lucas, 1844) - Cambridge, 1872: 275, *Tegenaria annulipes*, sp.nov., in crevices of rocks on the sides of the Lebanon range.

Tegenaria maronita sp.nov. - Simon, 1873: 142. Cette *Tegenaria* a été trouvée dans le Liban par M. Ch. de la Brûlerie.

Tegenaria annulipes Cambridge, 1872 - Simon, 1884: 186, Beirut.

Tegenaria maronita Simon, 1873 - Brignoli, 1978a: 207, Bcharré - Cèdres de Bcharré, 1950m, 3/5.VI.72, P. Brignoli leg., 1♀. Baalbeck - Ainata, 1500m, 31.V./5.VI.72, P. Brignoli leg., 1♂, 2♀♀. "Liban/Syria", Ch. de la Brulerie leg., 1♂, 1♀ (types; Coll. Simon, Mus. Paris 4♂♀; with label *annulipes* = *maronita*). Comments: this species is probably the commonest Lebanese *Tegenaria*; I found it under stones in the famous cedar grove of Bcharré and in crevices of rocks in open ground at Ainata.

Tegenaria maronita Simon, 1873 - Levy, 1996: 100, *Tegenaria annulipes*. O.P.-Cambridge, 1872: 275; type, adult ♀ from Lebanon (HECO, B. 456, t. 5). *Tegenaria maronita*. Simon, 1873: 141; type adult ♂ from Lebanon, leg. Ch. de Brulerie (MNHN, B. 469). Synonymized with *annulipes* by Simon, 1884: 186.

♂♀ *Malthonica pagana* (C.L. Koch, 1840)

Tegenaria pagana C.L. Koch, 1841 - Brignoli, 1978a: 207, "Syria", Ch. de la Brulerie leg., 1♂, 1♀ (Coll. Simon 478, part of the type series of *T. concolor*; labeled *pagana* by Mrs R. de Blauwe). Comments: I agree with Mrs de Blauwe that these specimens belong to this common Mediterranean species (described from Greece, Nauplia) which has often been misidentified.

Tegenaria pagana C.L. Koch, 1841 - Levy, 1996: 96, 97, *Comments*. There are, however, records by Kerville (1926: 68) from Lebanon (Cedar groves near Bcherre).

Genus ***Tegenaria*** Latreille, 1804

♂♀ ***Tegenaria dalmatica*** Kulczyński, 1906

Malthonica dalmatica (Kulczyński, 1906) - Bolzern *et al.*, 2010: 172, Lebanon: Mount Lebanon, NMB: AB 577.

Tegenaria dalmatica (Kulczyński, 1906) - Bolzern *et al.*, 2013: 795, Lebanon 1♂, 1♀.

♂♀ ***Tegenaria domestica*** (Clerck, 1757)

Tegenaria domestica (Clerck, 1758) - Bolzern *et al.*, 2013: 796, Lebanon 1♂.

♀ ***Tegenaria michae*** Brignoli, 1978

Only in Lebanon

Tegenaria michae n.sp. - Brignoli, 1978a: 208, f. 9, Bcharré - Cèdres de Bcharré, 1950 m, 3/5.VI.72, P. Brignoli leg., 3♀♀ (1♀, dissected, holotype, the other two paratypes; in my collection). *Derivatio nominis*. This species is named after my Lebanese wife, Micha, as an acknowledgement for her constant help in my work.

♂♀ ***Tegenaria parietina*** (Fourcroy, 1785)

Tegenaria parietina Frc. - Simon, 1884: 186, Beirut.

Tegenaria parietina (Fourcroy, 1785) - Levy, 1996: 104, *Comments*. *Tegenaria parietina* was previously recorded from Lebanon, Beirut, by Simon (1884: 186).

Tegenaria parietina (Fourcroy, 1785) - Bolzern *et al.*, 2013: 807, Lebanon 5♀.

Family ***Anyphaenidae*** Bertkau, 1878

Genus ***Anyphaena*** Sundevall, 1833

♂♀ ***Anyphaena syriaca*** Kulczyński, 1911

Only in Lebanon

Anyphaena syriaca Kulczyński, 1911 - Levy, 2003: 3, Kulczyński's ♂ and ♀ types from Beirut, Lebanon.

Family ***Araneidae*** Clerck, 1757

Genus ***Cyrtophora*** Simon, 1864

♂♀ ***Cyrtophora citricola*** (Forsskål, 1775)

Epeira opuntiae Duf. - Cambridge, 1872: 280, 301, found in abundance among the prickly pears at Beirut.

Levy, 1985a: 106, O.P.-Cambridge (1872: 280) found *Argyrodes syriaca* in Lebanon on webs of *Cyrtophora* (Araneidae).

Genus ***Hypsosinga*** Ausserer, 1871

♂♀ ***Hypsosinga albovittata*** (Westring, 1851)

Hypsosinga albovittata (Westring, 1851) - Levy, 1984: 127, 129, The only previous record of *H. albovittata* from the Middle East was that by Pavesi (1895, p. 7) of a specimen taken in July by E. Festa in Bakefaya, near Beirut, Lebanon (MIZST, 1♀, AR. 594).

Genus ***Leviellus*** Wunderlich, 2004

♂♀ ***Leviellus inconveniens*** (O.P.-Cambridge, 1872)

Epeira inconveniens sp.nov. - Cambridge, 1872: 298, found on low-growing plants at Beirut.

Zygiella inconveniens (O.P.-Cambridge, 1872) - Levy, 1987: 247, *Epeira inconveniens* O.P.-Cambridge, 1872, 298; types, adult ♀ and 1 immature from Beirut, Lebanon (HECO, B.1072, t.18). "The only *Zygiella* ever reported from the entire Middle East is *Z. inconveniens* known thus far solely by the female from Lebanon".

Genus ***Lipocrea*** Thorell, 1878

♂♀ ***Lipocrea epeiroides*** (O.P.-Cambridge, 1872)

Lipocrea epeiroides (O.P.-Cambridge, 1872), new combination - Levy, 1986: 7-8, Pavesi's (1895: 8) record from Beirut, Lebanon unfortunately is worthless since his determination combined *L. chloris* with *L. epeiroides*; this Lebanese specimen was the only araneid out of E. Festa's material from our region (determined by Pavesi) that could not be located.

Genus ***Mangora*** O.P.-Cambridge, 1889

♂♀ ***Mangora acalypha*** (Walckenaer, 1802)

Mangora acalypha (Walckenaer, 1802) - Levy, 1987: 252, Lebanon (near Beirut; Kerville 1926, 66).

Genus ***Neoscona*** Simon, 1864

♂♀ ***Neoscona subfusca*** (C.L. Koch, 1837)

Epeira perplicata sp.nov. - Cambridge, 1872: 301, found on low-growing plants in geometric snares at Beirut.

Genus ***Singa*** C.L. Koch, 1836

♂♀ ***Singa lucina*** (Savigny, 1825)

Singa lucina (Audouin, 1827) - Levy, 1984: 122, *Comments*. It is recorded herein for the first time from Lebanon (NMV, 2 ♀♀, Beirut, Ribbe 1880).

Singa lucina (Audouin, 1825) - Levy, 1991: 232, Lebanon.

Family ***Cithaeronidae*** Simon, 1893

Genus ***Cithaeron*** O.P.-Cambridge, 1872

♂♀ ***Cithaeron praedonius*** O.P.-Cambridge, 1872

Cithaeron praedonium sp.nov. - Cambridge, 1872: 273, under a stone on the Lebanon, and at Hasbeiya.

Cithaeron praedonius - Platnick, 1991: 6, "both specimens* are actually penultimate females rather than adults" [* Cambridge's specimens from Lebanon.]

Family ***Corinnidae*** Karsch, 1880

Genus ***Phrurolithus*** C.L. Koch, 1839

♀ ***Phrurolithus flavipes*** O.P.-Cambridge, 1872

Only in Lebanon

Phrurolithus flavipes sp.nov. - Cambridge, 1872: 252 (Plate XVI, fig.35) at Hasbeiya, under stones, on an old wall, and another in a similar situation on Mount Lebanon.

Family ***Cybaeidae*** Banks, 1892

Genus ***Cedicus*** Simon, 1875

♂♀ ***Cedicus flavipes*** Simon, 1875

Cedicus flavipes Simon, 1875 - Levy, 1996: 118, 120, *Cedicus flavipes* Simon, 1875: 48, pl.5, fig. 15, ♂♀; syntypes, ♂ + 2♀♀ from Syria of Ottoman period (MNHN, B.1936, t.431, t.491). p.120 Lebanon (Kerville, 1926: 68, Brumana).

? *Paracedicus baram* Levy, 2007: 8-10, Figs. 16–22. Probably occurs in Lebanon.

Family **Dictynidae** O.P.-Cambridge, 1871

Genus **Devade** Simon, 1884

♀ *Devade libanica* (Denis, 1955)

Only in Lebanon

Pseudauximus libanicus - Denis, 1955: 452, f. VI (D♀).

Genus **Dictyna** Sundevall, 1833

♂♀ *Dictyna arundinacea* (Linnaeus, 1758)

Dictyna benigna Bl. - Cambridge, 1872: 261, on low plants on the Lebanon.

Family **Dysderidae** C.L. Koch, 1837

Genus **Dasumia** Thorell, 1875

♂ *Dasumia sancticedri* Brignoli, 1978

Only in Lebanon

Dasumia sancticedri - Brignoli, 1978b: 174, f. 1-2 (D♂).

Genus **Dysdera** Latreille, 1804

♂ *Dysdera cristata* Deeleman-Reinhold, 1988

Dysdera cristata - Gasparo, 2003: 230, Lebanon.

♂♀ *Dysdera denticelis* Simon, 1882

Only in Lebanon

Dysdera denticelis - Simon, 1882: 208, Liban (Ch. De Brûlerie).

Dysdera denticelis - Deeelman-Reinhold & Deeelman, 1988: 218, Matériel étudié. Liban: 1 ♂, 1 ♀, holotype et paratype "Syrie, Ch. De Brûlerie" (MNHP, Coll. Simon 1.159).

♂♀ *Dysdera westringi* O.P.-Cambridge, 1872

Dysdera kollari Doblaka - Simon, 1884: 190, Antoura near Beirut ?? doubtful identification *Dysdera westringi* Cambr.

Dysdera westringi - Gasparo, 2003a: 220, *D. westringi* O. Pickard-Cambridge (together with a single male specimen dubiously attributed to this species).

♂♀ *Dysdera maronita* Gasparo, 2003

Only in Lebanon

Dysdera maronita - Gasparo, 2003: 225, Lebanon.

♂♀ *Dysdera simoni* Deeelman-Reinhold, 1988

Dysdera simoni - Deeelman-Reinhold, in Deeelman-Reinhold & Deeelman, 1988: 208, Matériel étudié. Liban: Beyrouth, 2 ♂, 3 ♀. "crocota", 1886, Leuttmer (NMW 223).

♂♀ *Dysdera spinicrus* Simon, 1882

Dysdera spinicrus - Simon, 1882: 209, 209 Liban, (Ch. De Brûlerie).

Dysdera spinicrus - Deeelman-Reinhold & Deeelman, 1988: 206, Liban.

Dysdera spinicrus - Gasparo, 2003: 213, Lebanon.

♂ *Dysdera vignai* Gasparo, 2003

Only in Lebanon

Dysdera vignai - Gasparo, 2003: 209, Lebanon.

Genus **Harpactea** Bristowe, 1939

Harpactea straba Denis, 1955a: 440 (j, Lebanon) - Brignoli, 1978b: 174. Nomen dubium.

♀ *Harpactea rugichelis* Denis, 1955

Only in Lebanon

Harpactea rugichelis - Denis, 1955: 440.
Harpactea rugichelis - Brignoli, 1978b: 174.

Family **Filistatidae** Ausserer, 1867

Genus **Filistata** Latreille, 1810

Filistata hirsuta sp.nov. - Cambridge, 1872: 218, under a stone on the skirts of the Lebanon.

Filistata hirsuta O.P.-Cambridge, 1872: 217 (j, Lebanon) - Brignoli, 1982a: 70. Nomen dubium.

Family **Gnaphosidae** Pocock, 1898

Genus **Drassodes** Westring, 1851

♂♀ **Drassodes lapidosus** (Walckenaer, 1802)

Drassus lapidosus - Simon, 1884: 187, Beirut and Antoura.

♂♀ **Drassodes unicolor** (O.P.-Cambridge, 1872)

Drassus unicolor sp.nov. - Cambridge, 1872: 241 (Plate XV, fig.18), under a stone on the Lebanon.

Drassodes unicolor Cambridge, 1872 - Levy, 2004: 8, 10, *Drassodes unicolor* Cambridge, 1872: 240, pl. 15, fig. 18; ♀ type from Lebanon (HECO, cannot be traced). 10 ♀♀ from Beirut, Lebanon, (NMV, No. 12706, leg. Leuthner, 1886).

Drassodes unicolor (O.P.-Cambridge, 1872) - Bosmans & Chatzaki, 2005: 81, Lebanon.

Genus **Gnaphosa** Latreille, 1804

♂♀ **Gnaphosa dolosa** Herman, 1879

Gnaphosa barroisi - Levy, 1995: 977, *Gnaphosa barroisi* Simon, 1892: 81; ♀ from Lebanon, near Lake Yamoune (MNHN, B.644, Ar.2991) E. Simon det. (Kerville, 1926: 26).

♂♀ **Gnaphosa rufula** (L. Koch, 1866)

Gnaphosa ? rufula - Levy, 1995: 977, 978, Lebanon (no precise locality; specimen collected in 1934 along trip in the north). 1 adult female from northern Lebanon (July).

Genus **Leptodrassex** Murphy, 2007

♂♀ **Leptodrassex simoni** (Dalmas, 1919)

Leptodrassex simoni - Levy, 1999b: 446, Only Lebanon, no locality of the male genitalia drawn from Lebanon.

Genus **Leptopilos** Levy, 2009

♂♀ **Leptopilos tenerrimus** (O.P.-Cambridge, 1872)

Drassus tenerrimus sp.nov. - Cambridge, 1872: 233 (Plate XV, fig.10), under a stone at Hasbeiya.

Genus **Micaria** Westring, 1851

♂♀ **Micaria pallipes** (Lucas, 1846)

Micaria septempunctata sp.nov. - Cambridge, 1872: 250 (Plate XVI, fig.32), under stones on an old wall at Hasbeiya and on the Lebanon, near Ain-Ata.

Genus **Nomisia** Dalmas, 1921

♂♀ **Nomisia aussereri** (L. Koch, 1872)

Nomisia aussereri - Grimm, 1985: 85, Libanon, 1 ♀ (SMF RII/11800).

Nomisia aussereri - Levy, 1995: 929, 931, Grimm, 1985: 84, figs. 81-83; ♂♀ from Lebanon (no precise locality; SMF 33838, 33849, Grimm det.).

♂♀ *Nomisia excerpta* (O.P.-Cambridge, 1872)

Gnaphosa excerpta - O.P.-Cambridge, 1872: 226, found under a stone at Nazareth.

Nomisia excerpta - Platnick, 2013: ..., Lebanon.

♂♀ *Nomisia ripariensis* (O.P.-Cambridge, 1872)

Pythonissa ripariensis Cambr. - Simon, 1884: 187, Beirut (one specimen).

Nomisia ripariensis - Levy, 1995: 931, 933, Lebanon (Beirut).

Genus *Pterotricha* Kulczyński, 1903

♂♀ *Pterotricha kochi* (O.P.-Cambridge, 1872)

Gnaphosa kochii sp.nov. - Cambridge, 1872: 230 (Plate XV, fig.6), beneath a stone near Ain Ata, under the Lebanon range.

Pterotricha kochii - Levy, 1995: 969, *Pterotricha kochii* Cambridge, 1872: 229, pl. 15, fig. 6; ♂ holotype from Lebanon, Ain Ata, cannot be traced (♂ in HECO, B.277, t.31, incompatible with data; mislabeled; presumably appertains to species in the southern fauna). *Pterotricha kochi* Dalmas, 1921: 252, figs. 2, 16 ♀; ♂♂ and ♀ from Lebanon, Ba'albeck, and Syria, Damascus, Ain Fidje (MNHN, B661, Ar.3131).

♂♀ *Pterotricha lutata* (O.P.-Cambridge, 1872)

Gnaphosa lutata sp.nov. - Cambridge, 1872: 229 (Plate XV, fig.7), under a stone near Beirut.

Pythonissa lutata Cambr. - Simon, 1884: 187, Beirut and Antoura (common).

Pterotricha lutata - Levy, 1995: 954, 956, *Pterotricha lutata* Cambridge, 1872: 228, pl. 15, fig. 7; ♂ holotype from Lebanon, Beirut, cannot be traced in HECO. p.956 Distribution. Lebanon (Beirut, Broumana, Dalmas, 1921: 256). Comments. "Simon's identification of *P. cambridgii* from Broumana, Lebanon (eventually published in Kerville, 1926: 64) was considered by Dalmas (1921: 256) as that of *P. lutata*".

Genus *Setaphis* Simon, 1893

♂♀ *Setaphis carmeli* (O.P.-Cambridge, 1872)

Prothesima carmeli Cambr. - Simon, 1884: 188 Beirut (one male).

Genus *Zelotes* Gistel, 1848

♂ *Zelotes berytensis* (Simon, 1884)

Prothesima berytensis sp.nov. - Simon, 1884: 188-189, Beirut (male sp.nov.).

♀ *Zelotes davidi* (Simon, 1884)

Prothesima davidi sp.nov. - Simon, 1884: 189, Beirut (female sp.nov.).

? Levy, 1995: 938: *Nomisia palaestina*; 950: *Pterotricha cambridgii*; 951, 954: *Pterotricha levantina*; 965, 967: *Pterotricha parasyriaca*, presumably Lebanon.

Family *Idiopidae* Simon, 1889

Genus *Idiops* Perty, 1833

♂ *Idiops syriacus* O.P.-Cambridge, 1870

Idiops syriacus - Cambridge, 1872: 216, in a bank near Beirut.

Family **Leptonetidae** Simon, 1890

Genus **Cataleptoneta** Denis, 1955

♂♀ **Cataleptoneta edentula** Denis, 1955

C. e. Denis, 1955: 442, f. IIA-D (D♂♀).

Only in Lebanon

Family **Linyphiidae** Blackwall, 1859

Genus **Agyneta** Hull, 1911

♂♀ **Agyneta fuscipalpa** (C.L. Koch, 1836)

Erigone inexpedibilis sp.nov. - Cambridge, 1872: 290, found on a dwarf shrub at Hasbeiya.

♂♀ **Agyneta rurestris** (C.L. Koch, 1836)

Erigone rurestris Koch - Cambridge, 1872: 289, found at the Lebanon and Beirut.

Agyneta pseudorurestris Wunderlich, 1980 - Tanasevitch, 2013: 102, "It seems quite possible that *Erigone rurestris*, recorded by O.P.-Cambridge (1872) from Jerusalem, the Lebanon and Beirut (sic!), is a misidentified *A. pseudorurestris*."

Genus **Caviphantes** Oi, 1960

♂♀ **Caviphantes pseudosaxetorum** Wunderlich, 1979

Caviphantes pseudosaxetorum Wunderlich, 1979: 87, f. 1-7 (D♂♀).

Genus **Erigone** Savigny, 1825

♂ **Erigone dentipalpis syriaca** O.P.-Cambridge, 1872

Erigone dentipalpis Westr., var. *syriaca*, Cambr. - Cambridge, 1872: 291, found on the roadway between Hasbeiya and Damascus.

Genus **Frontinellina** van Helsdingen, 1969

♂♀ **Frontinellina frutetorum** (C.L. Koch, 1834)

Linyphia congener sp.nov. - Cambridge, 1872: 294, found among shrubs on the Lebanon.

Genus **Lepthyphantes** Menge, 1866

♂♀ **Lepthyphantes leprosus** (Ohlert, 1865)

Linyphia leprosa, Ohl. - Cambridge, 1872: 294, found on the Lebanon.

♀ **Lepthyphantes speculae** Denis, 1959

Only in Lebanon

Lepthyphantes coiffaiti Denis, 1955: 448, f. IVA-C (D♀, preoccupied by Denis, 1953).

♂ **Lepthyphantes vividus** Denis, 1955

Only in Lebanon

Lepthyphantes vividus Denis, 1955: 449, f. VA-B (D♂).

Genus **Linyphia** Latreille, 1804

♂♀ **Linyphia mimonti** Simon, 1884

Linyphia pulchra Kulczyński, 1911: 28, pl. 2, f. 27-29 (D♀).

Linyphia mimonti Simon, 1884 - Tanasevitch, 2013: 111, "... known from ... Lebanon."

Linyphia mimonti Simon, 1884 - Bosmans & Chatzaki, 2005: 45, Lebanon.

Genus **Pelecopsis** Simon, 1864

♂ **Pelecopsis pavidia** (O.P.-Cambridge, 1872)

Erigone pavidia sp.nov. (*Walckenaera*, Bl.) - Cambridge, 1872: 293 (Plate XIV,

fig.22), found under a stone at Hasbeiya.

Genus **Styloctetor** Simon, 1884

♂♀ **Styloctetor romanus** (O.P.-Cambridge, 1872)

Erigone incauta sp.nov. - Cambridge, 1872: 289, found under a stone on the Lebanon.

Family **Liocranidae** Simon, 1897

Genus **Mesiotelus** Simon, 1897

♀ **Mesiotelus libanicus** (Simon, 1878)

Only in Lebanon

Liocranum libanicum - Simon, 1878a: 52, Liban (Ch. de la Brûlerie).

Family **Lycosidae** Sundevall, 1833

Genus **Alopecosa** Simon, 1885

♂♀ **Alopecosa pulverulenta** (Clerck, 1757)

Lycosa trucidatoria Walck. - Cambridge, 1872: 316, found at Beirut.

Genus **Arctosa** C.L. Koch, 1847

♂♀ **Arctosa dissonans** (O.P.-Cambridge, 1872)

Lycosa dissonans sp.nov. - Cambridge, 1872: 317, found in moist places near Beirut.

Genus **Aulonia** C.L. Koch, 1847

♂♀ **Aulonia albimana** (Walckenaer, 1805)

Lycosa albimana Koch - Cambridge, 1872: 316, near the Lebanon.

Genus **Geolycosa** Montgomery, 1904

♂♀ **Geolycosa vultuosa** (C.L. Koch, 1838)

Lycosa infernalis - Simon, 1884: 185, Antoura near Beirut.

Genus **Hogna** Simon, 1885

♂♀ **Hogna radiata** (Latreille, 1817)

Lycosa radiata - Simon, 1884: 185, Beirut.

Genus **Hyaenosa** Caporiacco, 1940

♂♀ **Hyaenosa effera** (O.P.-Cambridge, 1872)

Lycosa effera sp.nov. - Cambridge, 1872: 319, found at the Lebanon and Beirut.

Genus **Lycosa** Latreille, 1804

♂♀ **Lycosa piochardi** Simon, 1876

Lycosa piochardi E. Simon, 1876 - Simon, 1884: 184, Beirut and Antoura.

♂♀ **Lycosa tarantula** (Linnaeus, 1758)

Lycosa (Tarentula) apuliae Walck. - Cambridge, 1872: 316, found at Beirut.

Genus **Pardosa** C.L. Koch, 1847

♂♀ **Pardosa nigra** (C.L. Koch, 1834)

Lycosa nigra? Koch - Cambridge, 1872: 316, found on the road from Hasbeiya to Damascus.

Genus **Wadicosa** Zyuzin, 1985

♂♀ **Wadicosa fidelis** (O.P.-Cambridge, 1872)

Lycosa fidelis sp.nov. - Cambridge, 1872: 320, found at Beirut.

Family **Mimetidae** Simon, 1881

Genus **Mimetus** Hentz, 1832

♀ **Mimetus monticola** (Blackwall, 1870)

Ctenophora monticola Bl. - Cambridge, 1872: 287, found in irregular snares among prickly pears at Beirut.

Family **Miturgidae** Simon, 1886

Genus **Cheiracanthium** C.L. Koch, 1839

♂♀ **Cheiracanthium mildei** L. Koch, 1864

Chiracanthium mildei L. Koch - Simon, 1884: 190, Antoura (one male).

♂♀ **Cheiracanthium seidlitzii** L. Koch, 1864

Cheiracanthium seidlitzii L. Koch - Cambridge, 1872: 255, at Beirut.

Family **Oecobiidae** Blackwall, 1862

Genus **Oecobius** Lucas, 1846

♂ **Oecobius affinis** O.P.-Cambridge, 1872

Only in Lebanon

Oecobius affinis sp.nov. - Cambridge, 1872: 222, on stones and rocks at Hasbeiya.

Oecobius affinis - Wunderlich, 1995: 590, f. 1-3. 3♂, 4j, HEC b.500, t.1.

♂ **Oecobius cambridgei** Wunderlich, 1995

Only in Lebanon

Oecobius affinis, sp.nov. - Cambridge, 1872: 222, at the foot of the Lebanon range near Ain Ata.

Oecobius cambridgei - Wunderlich, 1995: 592, f. 13-16 (D♂).

♂♀ **Oecobius teliger** O.P.-Cambridge, 1872

Oecobius teliger sp.nov. - Cambridge, 1872: 221 (Plate XIII, fig.8), on stones and rocks at Beirut.

Oecobius teliger - Wunderlich, 1995: 599, f. 54-57 (removed ♂♀ from S of *O. navus*).

Family **Oonopidae** Simon, 1890

Genus **Opopaea** Simon, 1891

♂♀ **Opopaea punctata** (O.P.-Cambridge, 1872)

Oonops punctatus sp.nov. - Cambridge, 1872: 223 (Plate XIV, fig.3a), 224, under a stone on a wall close to Hasbeiya.

Opopaea punctata - Brignoli, 1975: 224, Jezzine, south Lebanon, near Hassbaya, and in the Barouk (Mount Lebanon).

Opopaea punctata - Assi, 1982: 86, "Ksara [1050 m], sur le versant oriental du Mont Liban, au pied de la montagne Sannine (2628 m) donnant sur la plaine intérieure de la Békaa centrale."

Family **Oxyopidae** Thorell, 1870

Genus **Oxyopes** Latreille, 1804

♂♀ **Oxyopes lineatus** Latreille, 1806

Oxyopes gentilis (Koch) - Cambridge, 1872: 314, found near Beirut.

Oxyopes lineatus Latreille, 1806 - Brignoli, 1978a: 207, Chouf - Beit ed Din, 900 m, 29.V.72, P. Brignoli leg., 1♂. - Kfarhim, 200 m, 27.V.72, P. Brignoli leg., 1♀. - Bcharré - Bcharré, 1000-1100 m, 4.VI.72, P. Brignoli leg., 1♀. - Hassroun, 1500 m, 2.VI.72, P. Brignoli leg., 3♂♂.

Genus **Peucetia** Thorell, 1869

♂♀ **Peucetia virescens** (O.P.-Cambridge, 1872)

Peucetia virescens Cambr. - Simon, 1884: 183, Antoura near Beirut.

Family **Palpimanidae** Thorell, 1870

Genus **Palpimanus** Dufour, 1820

♂♀ **Palpimanus simoni** Kulczyński, 1909 - Platnick, 1981: 173, (four male syntypes from Syria and Palestine, in MNHN) ... Known ... from Lebanon.

Family **Philodromidae** Thorell, 1870

Genus **Philodromus** Walckenaer, 1826

♂♀ **Philodromus aureolus** (Clerck, 1757)

Philodromus aureolus (Clerck, 1757) - Assi, 1986: 45, Hadath-Beyrouth and Ksara.

♂♀ **Philodromus glaucinus** Simon, 1870

Philodromus glaucinus Simon, 1870 - Assi, 1986: 45, Ksara.

♂♀ **Philodromus medius** O.P.-Cambridge, 1872

Philodromus medius sp.nov. - Cambridge, 1872: 311, found running on the ground, as well as on low shrubs and plants at Beirut.

Philodromus pulchellus Lucas, 1846 - Levy, 1877: 198-200, examined types described by Cambridge 1872 as *P. medius* from Palestine and Lebanon.

♂♀ **Philodromus pulchellus** Lucas, 1846

Philodromus pulchellus Lucas, 1846 - Assi, 1986: 45, Ksara.

Genus **Thanatus** C.L. Koch, 1837

♂♀ **Thanatus fabricii** (Audouin, 1825)

Thanatus fabricii (Audouin, 1825) - Assi, 1986: 45, Daouha on the Lebanese coast south of Beirut, in the mountains and in the Bekaa (Ksara, Qaa-er-Rim, Terbol, Makne).

♂♀ **Thanatus vulgaris** Simon, 1870

Thanatus vulgaris Simon, 1870 - Assi, 1986: 45, Terbol and in different stations of Nahr Ibrahim.

Family **Pholcidae** C.L. Koch, 1850

Genus **Holocnemus** Simon, 1873

♂♀ **Holocnemus pluchei** (Scopoli, 1763)

Pholcus rivulatus Savigny - Cambridge, 1872: 277, among ruins and in old buildings at Beirut.

Holocnemus rivulatus Forsk. - Simon, 1884: 186, Beirut.

Holocnemus pluchei (Scopoli, 1763) - Brignoli, 1977: 31, Bcharré – Col des Cèdres, m 2300, 31.V./3.VI.72, P. Brignoli leg., 1♀. - Kesrouane – Bqaatouta, m 1200, 22.V.72, P. Brignoli leg., 1♂, 2♀♀, 1°. - Chouf – Deir el Kamar, m 900, 27/30.V.72, P. Brignoli leg., 1♂. - Note. It is reported before from Beirut, Brumana e Beit-Meri (O. Pickard Cambridge, 1872 e Kerville, 1926).

Genus **Hoplopholcus** Kulczyński, 1908

♂♀ **Hoplopholcus cecconii** Kulczyński, 1908

Hoplopholcus subterraneus - Brignoli, 1979: 350, Material examined: 2 ♂♂, 3 ♀♀ (1 lacking the abdomen), 1 juv. from Lebanon, grotte de Djezzine (coll. Denis AR 2035-2036) and 1 male palpus apparently from Lebanon, grotte de Antelias (found in the tube AR 1704 in which was the type of *Harpactea straba* Denis, 1955, described from this cave). In the original paper (Denis, 1955) the following material was listed: grotte d'Amchita, 2 ♂♂, grotte d'Antelias, 2 ♂♂ ("holotypes", sic !), 2 juv., grotte de Jezzine (= Djezzine), 3 ♀♀ ("allotypes", sic !); doubtful were the records of 6 juv. from the caves of Touaite and Ghita.

Genus **Pholcus** Walckenaer, 1805

♀ ***Pholcus maronita*** Brignoli, 1977

Only in Lebanon

Pholcus maronita n.sp. - Brignoli, 1977: 31, Bcharré – Hassroun, m 1500, 2.VI.72, P. Brignoli leg., 2♀♀ (Holo- e paratypus).

Family **Pisauridae** Simon, 1890

Genus **Pisaura** Simon, 1885

♂♀ ***Pisaura consocia*** (O.P.-Cambridge, 1872)

Dolomedes consocius sp.nov. - Cambridge, 1872: 321, found on low-growing plants at the foot of the Lebanon near Ain-Ata.

Pisaura consocia Levy, 1999a: 58, f. 31A-B, 32A-B (♂♀). NOT SEEN

♂♀ ***Pisaura mirabilis*** (Clerck, 1757)

Pisaura mirabilis (Clerck, 1757) - Brignoli, 1978a: 206, Aley - El Mderej, 1300-1500 m, 23.V.72, P. Brignoli leg., 1♀. - Bcharré - Hassroun, 1500m, 2.VI.72, P. Brignoli leg., 1♀.

♀ ***Pisaura orientalis*** Kulczyński, 1913

Pisaura orientalis Kulczyński, 1913 - Bosmans & Chatzaki, 2005: 63, Lebanon.

Family **Prodidomidae** Simon, 1884

Genus **Prodidomus** Hentz, 1847

♂♀ ***Prodidomus amaranthinus*** (Lucas, 1846)

Miltia diversa sp.nov. - Cambridge, 1872: 219, under a stone at Hasbeiya.

Family **Salticidae** Blackwall, 1841

Genus **Aelurillus** Simon, 1884

Aelurillus candidus (Simon, 1868) Nomen dubium.

Salticus candidus Sim. - Cambridge, 1872: 322, an immature female at Beirut.

♂♀ ***Aelurillus aeruginosus*** (Simon, 1871)

Salticus arenicolor Sim. - Cambridge, 1872: 322, on the road from Damascus to Beirut.

♂ ***Aelurillus cognatus*** (O.P.-Cambridge, 1872)

Only in Lebanon

Salticus cognatus sp.nov. - Cambridge, 1872: 337, found among stones and rocks and dwarf plants near Ain-Ata, on the skirts of the Lebanon.

Genus **Bianor** Peckham & Peckham, 1886

♂♀ ***Bianor albobimaculatus*** (Lucas, 1846)

Salticus putus O.P.-Cambridge, 1872: 326 (Dm).

Salticus putus sp.nov. - Cambridge, 1872: 326, found on short herbage among stones at Rasheiya, on the skirts of Mount Hermon.

Genus **Cyrba** Simon, 1876

♂♀ **Cyrba algerina** (Lucas, 1846)

Cyrba algerina Lucas, 1842 - Simon, 1884: 182, Beirut, Antoura near Beirut.

Genus **Euophrys** C.L. Koch, 1834

♂ **Euophrys semirufa** Simon, 1884

Only in Lebanon

Evophrys semirufa sp.nov. - Simon, 1884: 182-183, Beirut (one male).

Genus **Habrocestum** Simon, 1876

♂♀ **Habrocestum latifasciatum** (Simon, 1868)

Salticus latifasciatus Sim. - Cambridge, 1872: 322 (Plate XIV, fig.18), on stone walls and rocks, at Hasbeiya and Beirut.

Genus **Hasarius** Simon, 1871

♂♀ **Hasarius adansoni** (Audouin, 1825)

Plexippus (Sav.). *Salticus adansonii* Sav. - Cambridge, 1872: 324, found in the Hotel d'Orient at Beirut.

Hasarius adansoni Aud. in Sav., 1827 - Simon, 1884: 182, Beirut.

Genus **Heliophanus** C.L. Koch, 1833

♂♀ **Heliophanus edentulus** Simon, 1871

Salticus heliophanoides sp.nov. - Cambridge, 1872: 328, found on the road from the Lebanon to Beirut.

♂♀ **Heliophanus mordax** (O.P.-Cambridge, 1872)

Heliophanus mordax Kulczyński, 1911: 53, pl. 2, f. 68-70 (♂, not ♀, =*H. ensifer*).

Genus **Leptorchestes** Thorell, 1870

♂♀ **Leptorchestes sikorskii** Prószyński, 2000

Leptorchestes sikorskii Prószyński, 2000: 246, f. 57-61 (D♂♀).

Leptorchestes sikorskii - Platnick, 2013: ..., Lebanon.

Genus **Macaroeris** Wunderlich, 1992

♂♀ **Macaroeris nidicolens** (Walckenaer, 1802)

Salticus castaneus Sim. - Cambridge, 1872: 321, found at Beirut.

Genus **Pellenes** Simon, 1876

♂♀ **Pellenes arciger** (Walckenaer, 1837)

Salticus semiater Sim. - Cambridge, 1872: 323, at Hasbeiya.

♂♀ **Pellenes epularis** (O.P.-Cambridge, 1872)

Salticus epularis sp.nov. - Cambridge, 1872: 329, found among stones on a bare and wild spot near Hasbeiya.

♂♀ **Pellenes geniculatus** (Simon, 1868)

Salticus simonii sp.nov. - Cambridge, 1872: 330, found among stones on the skirts of the Lebanon, near Ain-Ata.

♂ ***Pellenes laevigatus*** (Simon, 1868)

Salticus laevigatus Sim. - Cambridge, 1872: 322, on the skirts of the Lebanon.

Pellenes laevigatus (Simon, 1868) - Bosmans & Chatzaki, 2005: 112, Lebanon.

♀ ***Pellenes levaillanti*** (Lucas, 1846)

Salticus vaillantii Luc. - Cambridge, 1872: 323, on a prickly pear at Beirut.

Genus ***Philaeus*** Thorell, 1869

♂♀ ***Philaeus chrysops*** (Poda, 1761)

Salticus haemorrhoidicus Koch - Cambridge, 1872: 321, found near Ain-Ata, on the skirts of the Lebanon.

Philaeus chrysops Poda, 1761 - Simon, 1884: 182, Beirut.

Genus ***Plexippoides*** Prószyński, 1984

♂♀ ***Plexippoides flavescens*** (O.P.-Cambridge, 1872)

Salticus flavescens sp.nov. - Cambridge, 1872: 344, found on the skirts of the Lebanon near Ain-Ata.

Genus ***Plexippus*** C.L. Koch, 1846

♂♀ ***Plexippus devorans*** (O.P.-Cambridge, 1872)

Salticus devorans sp.nov. - Cambridge, 1872: 328, found at Rasheiya.

Family ***Segestriidae*** Simon, 1893

Genus ***Ariadna*** Savigny, 1825

♂♀ ***Ariadna insidiatrix*** Savigny, 1825

Ariadne insidiatrix Savigny - Cambridge, 1872: 223, in crevices of a bank near Beirut.

Ariadne insidiatrix Aud. in Sav., 1827 - Simon, 1884: 191, Beirut.

Genus ***Segestria*** Latreille, 1804

♀ ***Segestria davidi*** Simon, 1884

Segestria davidi sp.nov. - Simon, 1884: 190, Beirut.

♂♀ ***Segestria florentina*** (Rossi, 1790)

Segestria florentina - Simon, 1884: 191, Beirut.

Family ***Selenopidae*** Simon, 1897

Genus ***Selenops*** Latreille, 1819

♂♀ ***Selenops radiatus*** Latreille, 1819

Selenops aegyptiaca - Simon, 1884: 185, Beirut.

Family ***Sicariidae*** Keyserling, 1880

Genus ***Loxosceles*** Heineken & Lowe, 1832

♂♀ ***Loxosceles rufescens*** (Dufour, 1820)

Loxosceles rufescens L. Duf., 1820 - Simon, 1884: 191, Beirut.

Family ***Sparassidae*** Bertkau, 1872

Genus ***Eusparassus*** Simon, 1903

♂♀ ***Eusparassus walckenaeri*** (Audouin, 1825)

Sparassus walckenaerius Aud. in Sav., 1827 - Simon, 1884: 185, Beirut, Antoura.

Sparassus walckenaeri (Audouin, 1827) - Levy, 1989: 135, ..., Lebanon (Kerville, 1926).
Eusparassus walckenaeri (Audouin, 1825) - Moradmand & Jäger, 2012: 2454, Lebanon: 1♀, Amioun, 1944, H.B. Cott leg., (NHM 1950.3.30.124).

Genus ***Heteropoda*** Latreille, 1804

♂♀ ***Heteropoda variegata*** (Simon, 1874)

Heteropoda variegata (Simon, 1874) - Levy, 1989: 171-173, *Heteropoda variegata*, male from Lebanon (Beirut). "Simon, 1880b; 271, description of adults, possibly from Beirut, Lebanon." Note: Description below is of a male from Beirut, Lebanon (NMV).

Genus ***Micrommata*** Latreille, 1804

♂♀ ***Micrommata virescens ornata*** (Walckenaer, 1802)

Sparassus ornatus Walck. - Cambridge, 1872: 312, found at Beirut.

? Levy, 1989: 155-159, ***Cebrennus kochi*** (O.P.-Cambridge, 1872), p.158, probably Lebanon. ***Cebrennus kochi*** may occur in Syria and Lebanon ... but no collecting sites in these countries have been published.

Levy, 1989: 168-169, ***Micrommata ligurinum*** (C.L. Koch, 1845), probably Lebanon.

Family **Tetragnathidae** Menge, 1866

Genus ***Metellina*** Chamberlin & Ivie, 1941

♂♀ ***Metellina merianae*** (Scopoli, 1763)

Epeira antriada Walck. - Cambridge, 1872: 300, found in the Hotel d'Orient at Beirut.

Metellina merianae (Scopoli, 1763) - Levy, 1987: 255, *Distribution*. ..., Lebanon. *Record*. Lebanon: in the north. *Comments*. The Lebanese record above refers to a female specimen (HUU 13896) collected during a trip taken in northern Lebanon (19 July 1934), from Tripoli to Hermil and Ba'albek. Unfortunately, precise data on locality, etc., are not available (Mendelssohn, in litt.). The only previous record of *M. merianae* from this region was based on O.P.-Cambridge's misidentification of *antriada*, mentioned above. The erroneous, premature record of *M. merianae* from Lebanon has now been amended.

♂♀ ***Metellina segmentata*** (Clerck, 1757)

Metellina segmentata (Clerck, 1757) - Levy, 1987: 255, *Epeira antriada* Walckenaer. Misidentification, O.P.-Cambridge 1872, 300; ♀ from Beirut, Lebanon (HECO, B.831, T.15); not *E. antriada* = *M. merianae*. *Records*. Lebanon: Beirut (O.P.-Cambridge 1872); Ain Batara (Denis, 1955). *Comments*. O.P.-Cambridge's specimen was found inside the Hotel d'Orient in Beirut, not an unusual site for members of this genus, as reported from Europe by many authors. The record from Ain Batara (Denis 1955) in northern Lebanon (north of Kartaba) is of specimens taken in a humid, 80 m deep pit at an altitude of 1450 m. O.P.-Cambridge considered his specimen to be an immature female, hence its misidentification.

Genus ***Tetragnatha*** Latreille, 1804

♂ ***Tetragnatha minitabunda*** O.P.-Cambridge, 1872

Tetragnatha minitabunda sp.nov. - Cambridge, 1872: 296, found among plants in a moist place between Hasbeiya and Damascus.

♂♀ ***Tetragnatha nitens*** (Savigny, 1825)

Tetragnatha molesta sp.nov. - Cambridge, 1872: 296, found on low plants near Beirut.

Family **Theraphosidae** Thorell, 1869

Genus **Chaetopelma** Ausserer, 1871

♂♀ **Chaetopelma olivaceum** (C.L. Koch, 1841)

Avicularia tetramera sp.nov. - Simon, 1873: 18, Cette belle espèce, qui est le plus gros Aranéide de la faune méditerranéenne, m'a été rapportée du Liban par M. Ch. de la Brûlerie.

Avicularia striatocauda sp.nov. - Simon, 1873: 21, Cette belle et grande espèce a été découverte dans le Liban par M. Ch. de la Brûlerie; elle vit sous les pierres.

Ischnocolus syriacus - Simon, 1884: 191, Beirut, Antoura.

Family **Theridiidae** Sundevall, 1833

Genus **Euryopsis** Menge, 1868

Euryopsis inscripta (O.P.-Cambridge, 1872) - Nomen dubium

Theridion inscriptum sp.nov. - Cambridge, 1872: 284, found beneath a stone on the Lebanon.

Euryopsis inscripta (O.P.-Cambridge, 1872: 284, ♀, Lebanon, originally in *Theridion*) - Levy & Amitai, 1981a: 178, "*Theridion inscriptum* Cambridge, 1872, p. 284, from the Lebanon, listed commonly as *Euryopsis inscripta*, is an immature female of *Dipoena* (HECO, B. 588, t. 18). Being a juvenile of an unrecognisable species, it should be designated *nomen dubium*."

Genus **Latrodectus** Walckenaer, 1805

♂♀ **Latrodectus tredecimguttatus** (Rossi, 1790)

Latrodectus argus Sav. - Cambridge, 1872: 288, found in their snares among low plants near the earth near Beirut.

Genus **Neospintharus** Exline, 1950

♂♀ **Neospintharus syriacus** (O.P.-Cambridge, 1872)

Argyrodes syriaca sp.nov. - Cambridge, 1872: 280 (Plate XIII, fig.10), found in webs of *Epeira opuntiae*, among the branches of prickly pears, at Beirut.

Argyrodes syriaca - Levy, 1985a: 103-109, *Argyrodes syriaca* O.P.-Cambridge, 1872: 279, pl. 13, fig. 10; types 2♂♂ & 12♀♀ from Beirut, Lebanon (HECO, B. 546, t. 22, t. 23). p.109, He further noted that while *A. syriaca* seemed abundant in Lebanon. P.106 cont 109: O.P.-Cambridge (1872: 280) found *A. syriaca* in Lebanon on webs of *Cyrtophora* (Araneidae). He also described their egg cocoons as being of 'a pear-shape, produced at the larger end into a sort of obtuse neck, and fastened to the webs by a slender stalk'. He further noted that while *A. syriaca* seemed abundant in Lebanon, he did not find it in Palestine.

Argyrodes syriaca - Levy, 1998b: 118, "In Lebanon *A. syriaca* was first described on webs of *Cyrtophora* (Araneidae)."

Genus **Nesticodes** Archer, 1950

♂♀ **Nesticodes rufipes** (Lucas, 1846)

Theridion luteipes Cambr. - Cambridge, 1872: 280, found in the Hotel d'Orient at Beirut.

Theridion rufipes Lucas, 1846 - Levy & Amitai, 1982: 86, *Theridion luteipes* Cambridge, 1869. Cambridge, 1872: 280 (as *luteipes*); adult ♂ and imm. ♀ from Beirut, Lebanon (HECO, B. 597, t. 1).

Genus **Rhomphaea** L. Koch, 1872

♂♀ **Rhomphaea longicaudata** (O.P.-Cambridge, 1872)

Ariamne longicaudata sp.nov. - Cambridge, 1872: 278 (Plate XIV, fig.11a), found in webs of *Epeira opuntiae* (Duf.), on prickly pears, at Beirut.

Argyrodes longicaudata (O.P.-Cambridge, 1872) - Levy, 1985a: 109-111, *Ariamne longicaudata* O.P.-Cambridge, 1872: 277, pl. 14, fig. 11; ♂ type from Beirut, Lebanon (HECO, B. 562, t. 11a). p.110, Known only by the holotype from Beirut, Lebanon.

? *Achaearanea lunata* (Clerck, 1757) - Levy & Amitai, 1982: 123, *Distribution* "... it is expected to be present in Lebanon." *Comments* The Lebanon and northern Galilee may thus constitute the southernmost range of this species in the Middle East.

Levy & Amitai, 1982: 94, *Theridion simile* Koch, 1836 - *Distribution* ... and probably Lebanon.

Levy, 1998: 17, *Crustulina conspicua*; 43, *Enoplognatha parathoracica*; 46, *Enoplognatha mediterranea*; 58, *Steatoda dahli*; 165, *Achaearanea lunata* (= *Parasteatoda lunata*); 183, *Theridion simile* possibly in Lebanon.

Family **Thomisidae** Sundevall, 1833

Genus **Heriaeus** Simon, 1875

♂♀ **Heriaeus setiger** (O.P.-Cambridge, 1872)

Thomisus setiger sp.nov. - Cambridge, 1872: 308 (Plate XIV, fig.15), found on the ground in barren places near the sea at Beirut.

Heriaeus setiger Cambridge, 1872 - Levy, 1985b: 50, Lebanon.

Heriaeus setiger (O.P. Cambridge, 1872) - Assi, 1986: 43, Ksara.

Genus **Monaeses** Thorell, 1869

♂♀ **Monaeses israeliensis** Levy, 1973

Monaeses israeliensis Levy, 1973 - Assi, 1986: 43, in the valley of Nahr Ibrahim.

Genus **Ozyptila** Simon, 1864

♂♀ **Ozyptila tricoloripes** Strand, 1913

Oxyptila pickardi (Levy, 1975) - Assi, 1986: 44, in different stations in Nahr Ibrahim and Ksara.

Genus **Runcinia** Simon, 1875

♂♀ **Runcinia grammica** (C.L. Koch, 1837)

Runcinia lateralis (C.L. Koch, 1838) - Assi, 1986: 43, Hadath-Beyrouth.

Genus **Synema** Simon, 1864

♂♀ **Synema diana** (Audouin, 1825)

Synaema diana (Audouin, 1827) - Assi, 1986: 43, on *Poterium spinosum* in Ksara.

♂♀ **Synema globosum** (Fabricius, 1775)

Synaema globosum (Fabricius, 1775) - Assi, 1986: 43, on vegetation in Hadath-Beirut.

♂♀ **Synema plorator** (O.P.-Cambridge, 1872)

Synaema plorator (O.P.-Cambridge, 1872) - Bosmans & Chatzaki, 2005: 97, Lebanon.

Genus **Thomisus** Walckenaer, 1805

♂♀ **Thomisus onustus** Walckenaer, 1805

Thomisus albus - Simon, 1884: 186, Beirut.

Thomisus onustus Walckenaer, 1805 - Assi, 1986: 43, on plants in Jounieh and Batroun on the Lebanese coast, in Bhamdoun (1100m) in Mount Lebanon, and in Haouch-Sneid near Baalbek in the Bekaa.

Genus *Xysticus* C.L. Koch, 1835

♂♀ *Xysticus bliteus* (Simon, 1875)

Xysticus bliteus (Simon, 1875) - Assi, 1986: 44, Common in *Poterium spinosum* scrub of Ksara.

♂♀ *Xysticus caperatus* Simon, 1875

Xysticus caperatus (Simon, 1875) - Assi, 1986: 44, Rare in Ksara and in different stations of Nahr Ibrahim.

♂♀ *Xysticus gymnocephalus* Strand, 1915

Xysticus gymnocephalus Strand, 1915 - Assi, 1986: 44, Common, under and among stones, in the scrubland of Ksara and from the forest of Qaa-er-Rim to Chimsine (Anti-Lebanon).

♂♀ *Xysticus kempeleni* Thorell, 1872

Xysticus kempeleni Thorell, 1872 - Assi, 1986: 44, Beirut, Jamhour (400m) and Yahchouch.

♂♀ *Xysticus kochi* Thorell, 1872

Xysticus kochi Thorell, 1872 - Assi, 1986: 44, Rare in Ksara and Terbol (Central Bekaa).

♂♀ *Xysticus rectilineus* (O.P.-Cambridge, 1872)

Thomisus rectilineus sp.nov. - Cambridge, 1872: 306, found on low-growing plants near the mouth of the Dog River (Nahr el Kelb) near Beirut.

Xysticus rectilineus - Kulczyński, 1911: 31, pl. 1, f. 30, 32-33 (D♂♀).

Xysticus rectilineus Cambridge, 1872 - Levy, 1985b: 77, Lebanon.

Xysticus rectilineus (O.P. Cambridge, 1872) - Assi, 1986: 44, in the oak grove of Qaa-er-Rim (eastern slope of Mount Lebanon) and degraded scrub of Ksara and Makné (north Bekaa).

♂♀ *Xysticus tristrami* (O.P.-Cambridge, 1872)

Thomisus tristrami sp.nov. - Cambridge, 1872: 305 (Plate XIV, fig.16), the females were found under stones, the males running on the ground and upon plants and shrubs at the Lebanon.

Xysticus tristami (O.P. Cambridge, 1872) - Assi, 1986: 44, a common species in the scrub of Nahr Ibrahim.

♂♀ *Xysticus xerodermus* Strand, 1913

Xysticus xerodermus Strand, 1913 - Assi, 1986: 44, Ksara and Yahchouch.

Family **Uloboridae** Thorell, 1869

Genus *Uloborus* Latreille, 1806

♂♀ *Uloborus plumipes* Lucas, 1846

Uloborus plumipes Luc. - Cambridge, 1872: 303, Found in geometric snares at Beirut.

Family **Zodariidae** Thorell, 1881

Genus *Lachesana* Strand, 1932

♂♀ ***Lachesana blackwalli*** (O.P.-Cambridge, 1872)

Lachesis blackwalli sp.nov. - Cambridge, 1872: 268 (Plate XIII, fig.5), in a tubular silky web, among the loose broken earth of an old bank near Beirut.

Lachesana blackwalli (O.P.-Cambridge, 1872) - Levy, 1990b: 333-334, *Lachesis blackwalli* O.P.-Cambridge, 1872: 266, pl. 13, fig. 5; ♂ holotype from Jerusalem, Israel, ♀ from near Beirut, Lebanon (HECO, B. 485). *Distribution.* ..., Lebanon.

Lachesana blackwalli (O.P.-Cambridge, 1872) - Bosmans & Chatzaki, 2005: 76, Lebanon.

♂ ***Lachesana perversa*** (Savigny, 1825)

Lachesis perversa Savign. - Cambridge, 1872: 265, under a stone on the Lebanon near Ain-Ata.

Levy, 1990b: 337, *Comments* ... A record of *L. perversa* from Ein Ata, Lebanon mentioned by O.P.-Cambridge (1872: 265) proved to be an immature storenoid, possibly *Pax libani* (HECO, Bot. 485).

Genus ***Palaestina*** O.P.-Cambridge, 1872

♂♀ ***Palaestina expolita*** O.P.-Cambridge, 1872

Palaestina expolita sp.nov. - Cambridge, 1872: 270 (Plate XIII, fig.6), on the surface of rocks near Beirut and the Lebanon (Ain-Ata).

Palaestina expolita O.P.-Cambridge, 1872 - Levy, 1992: 69, types ♂♂ and ♀♀ from Palestine (Mount Carmel, Nain) and Lebanon (Beirut, Ain Ata) (HECO, B.439, t.9, 15).

Palaestina expolita O.P.-Cambridge, 1872 - Bosmans & Chatzaki, 2005: 76, Lebanon.

Genus ***Pax*** Levy, 1990

Genus ***Pax*** nov. - Levy, 1990b: 339, *Type-species.* *Habronestes libani* Simon, 1873, from Lebanon.

♂♀ ***Pax islamita*** (Simon, 1873)

Habronestes islamita sp.nov. - Simon, 1873: 76. Liban, M. Ch. de la Brûlerie.

Storena islamita - Simon, 1884: 186, Beirut.

Pax islamita (Simon, 1873) comb. nov. - Levy, 1990b: 358, *Habronestes islamita* Simon, 1873: 75; ♂♂ from Damascus, Lebanon, Tiberias (*leg.* Ch. de la Brûlerie, presumably in MNHN; cannot be located). p.359, *Distribution.* ..., Lebanon (Simon, 1873; Beirut, Simon, 1884: 186; near Ba'albek, Kerville, 1926: 65). *Comments.* An adult male and a female were collected in May and one male was found in August. *Pax islamita* like *P. libani* inhabits typical Mediterranean countryside sites. The two, apparently sympatric species, can even superficially be held apart by their coloration and size. *Pax islamita* although larger has a proportionally smaller epigynal plate than *P. libani*.

♂♀ ***Pax libani*** (Simon, 1873)

Habronestes libani sp.nov. - Simon, 1873: 75, M. Ch. de la Brûlerie à découvert cette espèce dans le Liban.

Pax libani (Simon, 1873) comb. nov. - Levy, 1990b: 343, *Habronestes libani* Simon, 1873: 73; ♂ & ♀ from Lebanon (*leg.* Ch. de la Brûlerie, presumably in MNHN; cannot be located).

Genus ***Zodarion*** Walckenaer, 1826

♂♀ ***Zodarion atriceps*** (O.P.-Cambridge, 1872)

Only in Lebanon

Enyo atriceps sp.nov. - Cambridge, 1872: 272, under a stone on the skirts of the Lebanon.

Zodarion atriceps (O. P. Cambridge, 1872) - Levy, 1992: 97-99, "It is known solely by a male and a female taken "from under a stone on the skirts of the Lebanon" (O. P. Cambridge, 1872: 272; HECO, B. 441, t. 5, ♂ & ♀). *Z. atriceps* from Lebanon, syntypes.

♂♀ *Zodarion graecum* (C.L. Koch, 1843)

Zodarion graecum - Levy, 1992: 97, Presumably in Syria and Lebanon.

Zodarion graecum (C.L. Koch, 1843) - Bosmans & Chatzaki, 2005: 77, Lebanon.

♂♀ *Zodarion granulatatum* Kulczyński, 1908

Zodarion granulatatum - Levy, 1992: 92, 93, presumably in Lebanon.

♂♀ *Zodarion lutipes* (O.P.-Cambridge, 1872)

Z. atriceps Kulczyński, 1911: 26, pl. 1, f. 23 (♀, misidentified).

Z. l. Kulczyński, 1911: 26, pl. 1, f. 25-26 (♂).

Zodarion lutipes - Levy, 1992: 92, Lebanon: in the south-east near Ein Arab, 1300 m (234/333).

♂♀ *Zodarion thoni* Nosek, 1905

Zodarion graecum C. Koch, 1843 - Simon, 1884: 186, Beirut (♀, misidentified).

Zodarion cyprium Kulczyński, 1908 - Bosmans & Chatzaki, 2005: 76, Lebanon.

Family **Zoridae** F.O.P.-Cambridge, 1893

Genus **Zora** C.L. Koch, 1847

Hecaerge maculata sp.nov. - Cambridge, 1872: 258, near Beirut.

Zora maculosa Roewer, 1951: 447, Nomen dubium.

♀ *Zora opiniosa* (O.P.-Cambridge, 1872)

Only in Lebanon

Hecaerge ? opiniosa sp.nov. - Cambridge, 1872: 258 (Plate XVI, fig.43), on the Lebanon. Levy, 2003: 12-13. "*Hecaerge opiniosa* O.P.-Cambridge, 1872: 258. Adult ♀ from Lebanon, cannot be traced in HECO. Judging from the original description, it definitely does not belong in Zoridae or Ctenidae. O.P.-Cambridge himself added a question mark doubting its placement."

Family **Zoropsidae** Bertkau, 1882

Genus **Zoropsis** Simon, 1878

♂♀ *Zoropsis lutea* (Thorell, 1875)

Z. l. Kulczyński, 1911: 12, pl. 1, f. 2 (f).

Z. l. asiatica Kulczyński, 1911: 12, pl. 1, f. 1 (Df).

Zoropsis lutea (Thorell, 1875) - Levy, 1990a: 141, *Zoropsis lutea asiatica* Kulczyński, 1911: 12, pl. 1, fig. 1; ♀ type of subspecies from Beirut, Lebanon (leg. P. Bovier-Lapierre) presumably in Warsaw. Specimens from Beirut (leg. I. Aharoni, March 1925; NMV, Inv. No. 12371). Validity of separate subspecies rejected.

♂♀ *Zoropsis thaleri* Levy, 2007

Zoropsis libanica - Simon, 1884: 190 (Turkey).

Zoropsis libanica - Thaler, van Harten & Knoflach, 2006: 251, Nomen nudum.

Zoropsis thaleri n. sp. - Levy, 2007: 6-7, *Distribution. ...*, Lebanon.

List of Spiders of Lebanon

* = endemic, only in Lebanon

FAMILY **AGELENIDAE** C.L. Koch, 1837

Agelena labyrinthica (Clerck, 1757)
Agelescape affinis (Kulczyński, 1911)
Coelotes caudatus de Blauwe, 1973 *
Lycosoides coarctata (Dufour, 1831)
Malthonica maronita (Simon, 1873)
Tegenaria dalmatica Kulczyński, 1906
Tegenaria michae Brignoli, 1978 *

Agelena orientalis C.L. Koch, 1837
Agelescape livida (Simon, 1875)
Eratigena atrica (C.L. Koch, 1843)
Maimuna bovierlapierrei (Kulczyński, 1911)
Malthonica pagana (C.L. Koch, 1840)
Tegenaria domestica (Clerck, 1757)
Tegenaria parietina (Fourcroy, 1785)

FAMILY **ANYPHAENIDAE** Bertkau, 1878

Anyphaena syriaca Kulczyński, 1911

FAMILY **ARANEIDAE** Clerck, 1757

Cyrtophora citricola (Forsskål, 1775)
Leviellus inconueniens (O.P.-Cambridge, 1872)
Mangora acalypha (Walckenaer, 1802)
Singa lucina (Savigny, 1825)

Hypsosinga albobittata (Westring, 1851)
Lipocrea epeiroides (O.P.-Cambridge, 1872)
Neoscona subfusca (C.L. Koch, 1837)

FAMILY **CITHAERONIDAE** Simon, 1893

Cithaeron praedonius O.P.-Cambridge, 1872

FAMILY **CORINNIDAE** Karsch, 1880

Phrurolithus flavipes O.P.-Cambridge, 1872

FAMILY **CYBAEIDAE** Banks, 1892

Cedicus flavipes Simon, 1875

FAMILY **DICTYNIDAE** O.P.-Cambridge, 1871

Devade libanica (Denis, 1955) * *Dictyna arundinacea* (Linnaeus, 1758)

FAMILY **DYSDERIDAE** C.L. Koch, 1837

Dasumia sancticedri Brignoli, 1978 *
Dysdera dentichelis Simon, 1882 *
Dysdera simoni Deeleman-Reinhold, 1988
Dysdera vignai Gasparo, 2003 *
Harpactea rugichelis Denis, 1955 *

Dysdera cristata Deeleman-Reinhold, 1988
Dysdera maronita Gasparo, 2003 *
Dysdera spinicrus Simon, 1882
Dysdera westringi O.P.-Cambridge, 1872

FAMILY **FILISTATIDAE** Ausserer, 1867

Filistata hirsuta O.P.-Cambridge, 1872 – Nomen dubium.

FAMILY **GNAPHOSIDAE** Pocock, 1898

Drassodes lapidosus (Walckenaer, 1802)
Gnaphosa dolosa Herman, 1879
Leptodrassex simoni (Dalmás, 1919)
Micaria pallipes (Lucas, 1846)
Nomisia excerpta (O.P.-Cambridge, 1872)
Pterotricha kochi (O.P.-Cambridge, 1872)
Setaphis carmeli (O.P.-Cambridge, 1872)
Zelotes davidi (Simon, 1884)

Drassodes unicolor (O.P.-Cambridge, 1872)
Gnaphosa rufula (L. Koch, 1866)
Leptopilos tenerrimus (O.P.-Cambridge, 1872)
Nomisia aussereri (L. Koch, 1872)
Nomisia ripariensis (O.P.-Cambridge, 1872)
Pterotricha lutata (O.P.-Cambridge, 1872)
Zelotes berytensis (Simon, 1884)

FAMILY **IDIOPIDAE** Simon, 1889

Idiops syriacus O.P.-Cambridge, 1870

FAMILY LEPTONETIDAE Simon, 1890

Cataleptoneta edentula Denis, 1955 *

FAMILY LINYPHIIDAE Blackwall, 1859

Agyneta fuscipalpa (C.L. Koch, 1836)

Agyneta rurestris (C.L. Koch, 1836)

Caviphantes pseudosaxetorum Wunderlich, 1979

Erigone dentipalpis syriaca O.P.-Cambridge, 1872

Frontinellina frutetorum (C.L. Koch, 1834)

Lepthyphantes leprosus (Ohlert, 1865)

Lepthyphantes speculae Denis, 1959 *

Lepthyphantes vividus Denis, 1955 *

Linyphia mimonti Simon, 1884

Pelecopsis pavidus (O.P.-Cambridge, 1872)

Styloctetor romanus (O.P.-Cambridge, 1872)

FAMILY LIOCRANIDAE Simon, 1897

Mesiotelus libanicus (Simon, 1878) *

FAM. LYCOSIDAE Sundevall, 1833

Alopecosa pulverulenta (Clerck, 1757)

Arctosa dissonans (O.P.-Cambridge, 1872)

Aulonia albigera (Walckenaer, 1805)

Geolycosa vultuosa (C.L. Koch, 1838)

Hogna radiata (Latreille, 1817)

Hyaenosa effera (O.P.-Cambridge, 1872)

Lycosa piochardi Simon, 1876

Lycosa tarantula (Linnaeus, 1758)

Pardosa nigra (C.L. Koch, 1834)

Wadicosa fidelis (O.P.-Cambridge, 1872)

FAMILY MIMETIDAE Simon, 1881

Mimetus monticola (Blackwall, 1870)

FAMILY MITURGIDAE Simon, 1886

Cheiracanthium mildei L. Koch, 1864

Cheiracanthium seidlitzii L. Koch, 1864

FAMILY OECOBIIDAE Blackwall, 1862

Oecobius affinis O.P.-Cambridge, 1872

Oecobius cambridgei Wunderlich, 1995 *

Oecobius teliger O.P.-Cambridge, 1872

FAMILY OONOPIDAE Simon, 1890

Opopaea punctata (O.P.-Cambridge, 1872)

FAMILY OXYOPIDAE Thorell, 1870

Oxyopes lineatus Latreille, 1806

Peucetia virescens (O.P.-Cambridge, 1872)

FAMILY PALPIMANIDAE Thorell, 1870

Palpimanus simoni Kulczyński, 1909

FAMILY PHILODROMIDAE Thorell, 1870

Philodromus aureolus (Clerck, 1757)

Philodromus glaucinus Simon, 1870

Philodromus medius O.P.-Cambridge, 1872

Philodromus pulchellus Lucas, 1846

Thanatus fabricii (Audouin, 1825)

Thanatus vulgaris Simon, 1870

FAMILY PHOLCIDAE C.L. Koch, 1850

Holocnemus pluchei (Scopoli, 1763)

Hoplopholcus cecconii Kulczyński, 1908

Pholcus maronita Brignoli, 1977 *

FAMILY PISAURIDAE Simon, 1890

Pisaura consocia (O.P.-Cambridge, 1872)

Pisaura mirabilis (Clerck, 1757)

Pisaura orientalis Kulczyński, 1913

FAMILY **PRODIDOMIDAE** Simon, 1884
Prodidomus amaranthinus (Lucas, 1846)

FAMILY **SALTICIDAE** Blackwall, 1841

<i>Aelurillus aeruginosus</i> (Simon, 1871)	<i>Aelurillus cognatus</i> (O.P.-Cambridge, 1872) *
<i>Bianor albobimaculatus</i> (Lucas, 1846)	<i>Cyrba algerina</i> (Lucas, 1846)
<i>Euophrys semirufa</i> Simon, 1884	<i>Habrocestum latifasciatum</i> (Simon, 1868)
<i>Hasarius adansoni</i> (Audouin, 1825)	<i>Heliophanus edentulus</i> Simon, 1871
<i>Heliophanus mordax</i> (O.P.-Cambridge, 1872)	<i>Leptorchestes sikorskii</i> Prószyński, 2000
<i>Macaroeris nidicolens</i> (Walckenaer, 1802)	<i>Pellenes arciger</i> (Walckenaer, 1837)
<i>Pellenes epularis</i> (O.P.-Cambridge, 1872)	<i>Pellenes geniculatus</i> (Simon, 1868)
<i>Pellenes laevigatus</i> (Simon, 1868)	<i>Pellenes levaillanti</i> (Lucas, 1846)
<i>Philaeus chrysops</i> (Poda, 1761)	<i>Plexippoides flavescens</i> (O.P.-Cambridge, 1872)
<i>Plexippus devorans</i> (O.P.-Cambridge, 1872)	

FAMILY **SEGESTRIIDAE** Simon, 1893

<i>Ariadna insidiatrix</i> Savigny, 1825	<i>Segestria davidi</i> Simon, 1884
<i>Segestria florentina</i> (Rossi, 1790)	

FAMILY **SELENOPIIDAE** Simon, 1897

Selenops radiatus Latreille, 1819

FAM. **SICARIIDAE** Keyserling, 1880

Loxosceles rufescens (Dufour, 1820)

FAMILY **SPARASSIDAE** Bertkau, 1872

<i>Eusparassus walckenaeri</i> (Audouin, 1825)	<i>Heteropoda variegata</i> (Simon, 1874)
<i>Micrommata virescens ornata</i> (Walckenaer, 1802)	

FAMILY **TETRAGNATHIDAE** Menge, 1866

<i>Metellina merianae</i> (Scopoli, 1763)	<i>Metellina segmentata</i> (Clerck, 1757)
<i>Tetragnatha minitabunda</i> O.P.-Cambridge, 1872	<i>Tetragnatha nitens</i> (Savigny, 1825)

FAMILY **THERAPHOSIDAE** Thorell, 1869

Chaetopelma olivaceum (C.L. Koch, 1841)

FAMILY **THERIDIIDAE** Sundevall, 1833

<i>Euryopsis inscripta</i> (O.P.-Cambridge, 1872) originally in <i>Theridion</i>) Nomen dubium.	
<i>Latrodectus tredecimguttatus</i> (Rossi, 1790)	<i>Neospintharus syriacus</i> (O.P.-Cambridge, 1872)
<i>Nesticodes rufipes</i> (Lucas, 1846)	<i>Rhomphaea longicaudata</i> (O.P.-Cambridge, 1872)

FAMILY **THOMISIDAE** Sundevall, 1833

<i>Heriaeus setiger</i> (O.P.-Cambridge, 1872)	<i>Monaeses israeliensis</i> Levy, 1973
<i>Ozyptila tricoloripes</i> Strand, 1913	<i>Runcinia grammica</i> (C.L. Koch, 1837)
<i>Synema diana</i> (Audouin, 1825)	<i>Synema globosum</i> (Fabricius, 1775)
<i>Synema plorator</i> (O.P.-Cambridge, 1872)	<i>Thomisus onustus</i> Walckenaer, 1805
<i>Xysticus bliteus</i> (Simon, 1875)	<i>Xysticus caperatus</i> Simon, 1875
<i>Xysticus gymnocephalus</i> Strand, 1915	<i>Xysticus kempeleni</i> Thorell, 1872
<i>Xysticus kochi</i> Thorell, 1872	<i>Xysticus rectilineus</i> (O.P.-Cambridge, 1872)
<i>Xysticus tristrami</i> (O.P.-Cambridge, 1872)	<i>Xysticus xerodermus</i> Strand, 1913

FAMILY **ULOBORIDAE** Thorell, 1869

Uloborus plumipes Lucas, 1846

FAMILY **ZODARIIDAE** Thorell, 1881

Lachesana blackwalli (O.P.-Cambridge, 1872) *Lachesana perversa* (Savigny, 1825)
Palaestina expolita O.P.-Cambridge, 1872 *Pax islamita* (Simon, 1873)
Pax libani (Simon, 1873) *Zodarion atriceps* (O.P.-Cambridge, 1872) *
Zodarion graecum (C.L. Koch, 1843) *Zodarion granulatum* Kulczyński, 1908
Zodarion lutipes (O.P.-Cambridge, 1872) *Zodarion thoni* Nosek, 1905

FAMILY **ZORIDAE** F. O.P.-Cambridge, 1893

Zora maculosa Roewer, 1951 Nomen dubium. *Zora opiniosa* (O.P.-Cambridge, 1872) *

FAMILY **ZOROPSIDAE** Bertkau, 1882

Zoropsis lutea (Thorell, 1875) *Zoropsis thaleri* Levy, 2007

Family	Genera	Species	Endemic
AGELENIDAE	8	14	2
ANYPHAENIDAE	1	1	-
ARANEIDAE	7	7	-
CITHAERONIDAE	1	1	-
CORINNIDAE	1	1	1
CYBAEIDAE	1	1	-
DICTYNIDAE	2	2	1
DYSDERIDAE	3	9	5
FILISTATIDAE	1	1	-
GNAPHOSIDAE	9	15	1
IDIOPIDAE	1	1	-
LEPTONETIDAE	1	1	1
LINYPHIIDAE	8	11	2
LIOCRANIDAE	1	1	1
LYCOSIDAE	9	10	1
MIMETIDAE	1	1	-
MITURGIDAE	1	2	-
OECOBIIDAE	1	3	1
OONOPIDAE	1	1	-
OXYOPIDAE	2	2	-
PALPIMANIDAE	1	1	-
PHILODROMIDAE	2	6	-
PHOLCIDAE	3	3	1
PISAUROIDAE	1	3	-
PRODIDOMIDAE	1	1	-
SALTICIDAE	13	19	2
SEGESTRIIDAE	2	3	1
SELENOPIIDAE	1	1	-
SICARIIDAE	1	1	-
SPARASSIDAE	3	3	-
TETRAGNATHIDAE	2	4	-
THERAPHOSIDAE	1	1	-
THERIDIIDAE	5	5	-
THOMISIDAE	7	16	-

ULOBORIDAE	1	1	-
ZODARIIDAE	4	10	1
ZORIDAE	1	1	1
ZOROPSIDAE	1	2	-
Total 38	109	165	22

- Possibly, propably, and expected species are not included above.

Key to spider families recorded from Lebanon *

All Lebanese spiders belong to Opisthothelae [abdomen not segmented; spinnerets are on posterior end of abdomen].

1. Two pairs of booklungs; fangs closing in longitudinal axisMygalomorphae .. 2
- . One pair of booklungs or absent; fangs closing in transverse axis .. Araneomorphae .. 3
2. Leg tarsi with two claws Theraphosidae
- . Leg tarsi with three claws Idiopidae
3. Cribellum and calamistrum present, sometimes absent in males .. Cribellate spiders .. 6
- . Cribellum and calamistrum absent Ecribellate spiders 4
4. Six eyes 11
- . Eight eyes 5
5. Tarsus with two claws 15
- . Tarsus with three claws 28
6. Anal tubercle large, two-jointed with fringe of long curved setaeOecobiidae (Oecobiinae)
- . Anal tubercle normal, a single segment 7
7. Labium fused to sternum; eyes in a compact group on a slight hump; spinnerets advanced, located ventrally instead of terminally; carapace narrowed anteriorly; haplogyne Filistatidae
- . Labium not fused to sternum; eyes, spinnerets and carapace not as above; entelegyne 8
8. Posterior median eyes enlarged, at least two to four times as large as anterior median eyes; anterior leg pairs very long and slender (three or more times body length) Deinopidae [Known only as fossil from Lebanon until now.]
- . Posterior median eyes not greatly enlarged; front legs not as long or only the first pair greatly elongated 9
9. Femora with rows of long trichobothria; metatarsi IV compressed and curved under line of calamistrum; first pair of legs clearly longer than second pair Uloboridae
- . Femora without rows of long trichobothria; metatarsi IV not compressed and curved; pair of legs not longer 10
10. Calamistrum extends over almost entire length of metatarsi IV, which may be slightly curved Dictynidae
- . Calamistrum extends over part of metatarsi IV only in one or two rows or a brush of setae Zoropsidae

11. Eye formula 4.2; chelicerae with numerous teeth	Leptonetidae
- . Eye formula different; fewer teeth on cheliceral promargin	12
12. Tracheal spiracle single, inconspicuous, positioned just in front of spinnerets	Sicariidae
- . Tracheal spiracles distinct, anteriorly positioned, just behind epigastric groove, lungs may be replaced by pair of tracheae	13
13. Total body length of adult < 5 mm; female palp clawless; abdomen either with scuta or uniformly soft; endites converging; tarsal claws less well developed, without spatulated claw tufts	Oonopidae
- . Total body length of adult > 5 mm	14
14. Two tarsal claws; third pair of legs directed backwards; sternum extended around coxae	Dysderidae
- . Three tarsal claws; third pair of legs directed forwards; sternum normal	Segestriidae
15. Anterior pair of legs much stronger than other legs; metatarsi and tibiae I with strong prolateral scopulae	Palpimanidae
- . Anterior pair of legs different	16
16. Eyes in three rows (4:2:2); anterior median eyes very large; jumping spiders	Salticidae
- . Eyes arranged differently	17
17. Legs laterigrade, directed towards sides	18
- . Legs prograde, directed forwards (I, II) and backwards (III, IV)	21
18. Flat spiders with eyes in two rows (6:2)	Selenopidae
- . Eyes differently arranged	19
19. Tarsi and metatarsi without scapulae; legs I and II usually much longer than legs III and IV	Thomisidae
- . Tarsi and sometimes metatarsi with scapulae; legs different	20
20. Small to medium-size spiders (3-16 mm); chelicerae without teeth or at most one on retromargin; tarsus-metatarsus allowing movement in one plane only	Philodromidae
- . Medium-size to large spiders (6-35 mm); chelicerae with at least two teeth (rarely one) on retromargin; membranous connection to metatarsus permits free movement of tarsus	Sparassidae
21. Tracheal spiracle about $\frac{1}{3}$ abdominal length from spinnerets	Anyphaenidae
- . Tracheal spiracle in front of spinnerets	22
22. All tarsi clearly curled (in preserved specimens), pseudo-segmented	Cithaeronidae
- . Tarsi straight, not pseudo-segmented	23
23. Posterior median eyes flat, without dome-shaped lens; endites obliquely depressed	24
- . Posterior median eyes with dome-shaped lens; endites usually not obliquely depressed	25
24. Anterior spinnerets displaced forwards; spigots elongated with long plumose setae; eyes in circular arrangement or in two rows	Prodidomidae

- . Anterior spinnerets terminal; without long setae on spigots; eyes in two rows	Gnaphosidae
25. Eyes in three rows (2:4:2); anterior lateral eyes situated just in front of posterior lateral eyes; anterior legs with numerous ventral pairs of spines	Zoridae
- . Eyes in two rows (4:4)	26
26. Posterior spinnerets clearly two-segmented with distal segment distinctly conical	Miturgidae (in part Eutichurinae and Miturginae)
- . Posterior spinnerets with one segment only or if two-segmented, distal segment rounded	27
27. Median spinnerets of female with three, posterior spinnerets with two large cylindrical gland spigots	Corinnidae (Trachelinae & Corinninae)
- . Posterior spinnerets of female without such spigots, median spinnerets of females laterally flattened, with at least one row of large spigots	Liocranidae
28. Tarsi with trichobothria, often in a row	29
- . Tarsi without trichobothria	34
29. Eyes either in three to four rows or in three groups	30
- . Eyes in two rows	32
30. Clypeus very high; posterior eyes and anterior lateral eyes forming a hexagonal group in front of small anterior median eyes; numerous long spines on legs	Oxyopidae
- . Clypeus not as high; eye position and setae on legs different	31
31. Eyes sessile, not on tubercles; abdomen oval, smoothly rounded posteriorly; male palpal tibiae without retrolateral apophysis; egg cocoon carried attached to spinnerets; anal tubercle with one segment	Lycosidae
- . At least one pair of eyes on shallow tubercles; abdomen usually elongate, tapered to back; male palpal tibia with retrolateral apophysis; anal tubercle biarticulate ...	Pisauridae
32. Posterior spinnerets long and two-segmented; trochanters not notched	Agelenidae
- . Posterior spinnerets not particularly long or with one segment only; trochanters often notched	33
33. Anterior lateral spinnerets closely set, with short dome-shaped distal segment; trochanters not notched	Cybaidae
- . Anterior spinnerets either with one segment or distal segment shaped differently; trochanters may be notched	Zodariidae
34. Eyes in three groups, anterior median eyes apart, remainder in two triads; legs thin and long, tarsi pseudosegmented	Pholcidae
- . Eye pattern and legs different	35
35. Anterior tibiae and patellae with prolateral row of alternating long and short curved spines; chelicerae with peg teeth	Mimetidae
- . Legs without such spines	36
36. Paracymbium a separate sclerite; tarsi usually cylindrical (anterior sometimes fusiform); chelicerae often with stridulating file; small spiders (1.5-6 mm) ...	Linyphiidae
- . Paracymbium fused to cymbium or rudimentary; no cheliceral stridulating file; tarsi variable	37

37. Tarsi IV with ventral comb of serrated hairs; brownish rings around eyes; femora without spines Theridiidae
 -. Tarsi without ventral comb of serrated hairs; eyes without brownish rings 38
38. Male palp fairly simple, without median apophysis; conductor wrapping embolus; paracymbium elongate or squat Tetragnathidae
 -. Male palp complex, with median apophysis; embolus not wrapped by conductor; paracymbium often hook-shaped; chelicerae often swollen but not modified for courtship; epigyne often with scape Araneidae

 * Modified from Jocqué & Dippenaar-Schoeman (2006).

II. Scorpions of Lebanon

I could find only one Lebanese study of the scorpions of Lebanon by Abdul Jabbar I. Sammak (1963). It was a M.Sc. thesis submitted to the American University of Beirut. The author collected three species of two families: *Buthotus judaicus* and *Compsobuthus acutecarinatus* of Family Buthidae and *Scorpio maurus* of Family Scorpionidae. The thesis included a map of distribution of the two families in Lebanon.

Prof. Max Vachon (1966) recorded five species from Lebanon: *Buthotus judaicus* (Simon, 1872), *Leiurus quinquestriatus* (Hemprich et Ehrenberg, 1829), *Mesobuthus gibbosus* (Brullé, 1832), *Orthochirus innesi* Simon, 1910, and *Scorpio maurus* Linné, 1758.

Levy & Amitai (1980) recorded four species from Lebanon: *Buthotus judaicus*, *Compsobuthus werneri judaicus*, *Leiurus quinquestriatus hebraeus*, and *Scorpio maurus fuscus*, with the possibility of more one species: *Nebo hierichonticus*.

In the "Catalogue of the scorpions described from the Arab countries (1758-1990)" El-Hennawy (1992) recorded 12 species (+3 subspecies) of 10 genera of 3 families from Lebanon.

The following list of Lebanese scorpions includes 12 species of 10 genera of 2 families (Buthidae and Scorpionidae).

Order Scorpiones C.L.Koch, 1837

Family **Buthidae** C.L. Koch, 1837

Genus **Androctonus** Ehrenberg, 1828

Androctonus amoreuxi levyi Fet, 1997

Androctonus amoreuxi has a wide distribution from Senegal to Egypt and Sudan, to the southern border of Lebanon and to Afghanistan in the east (Levy & Amitai, 1980: 42).

Androctonus amoreuxi hebraeus (Werner, 1935); Kinzelbach, 1985; El-Hennawy, 1992: 107 Lebanon.

Androctonus amoreuxi levyi Fet, 1997; Fet & Lowe, 2000: 67 Lebanon.

Androctonus bicolor bicolor Ehrenberg, 1828

Androctonus bicolor Hemprich & Ehrenberg, 1829; Levy & Amitai, 1980*: 29, Map 2 A. *bicolor* is recorded near the borders between Israel and Lebanon; Kinzelbach, 1985; El-Hennawy, 1992: 108 Lebanon.

Androctonus bicolor bicolor Ehrenberg, 1828; Fet & Lowe, 2000: 70, 71 ?Lebanon.

*Levy & Amitai, 1980: 31, "A young specimen of *A. bicolor* was collected by Hemprich & Ehrenberg (1829) in Beirut, Lebanon. This northernmost record was doubted by later authors. The

species is, in fact, mainly found in southern Israel, but it ranges north along the Mediterranean coast as far as the northern border with Lebanon".

Androctonus crassicauda (Olivier, 1807)

Androctonus crassicauda (Olivier, 1807); Levy & Amitai, 1980: 29, Map 2 *A. c. crassicauda* is recorded near the borders between Israel and Lebanon; Kinzelbach, 1985; El-Hennawy, 1992: 110 Lebanon.

Genus ***Buthacus*** Birula, 1908

Buthacus leptochelys leptochelys (Ehrenberg, 1829)

Buthacus leptochelys (Hemprich & Ehrenberg, 1829); Kinzelbach, 1985; El-Hennawy, 1992: 113 Lebanon.

Buthacus leptochelys leptochelys (Ehrenberg, 1829); Fet & Lowe, 2000: 84 Lebanon.

Genus ***Buthus*** Leach, 1815

Buthus occitanus (Amoreux, 1789)

Buthus occitanus (Amoreux, 1789); Kinzelbach, 1985; El-Hennawy, 1992: 120; Fet & Lowe, 2000: 94 Lebanon.

Genus ***Compsobuthus*** Vachon, 1949

Compsobuthus weneri schmiedeknehti (VACHON, 1949)

Compsobuthus acutecarinatus; Sammak, 1963 Lebanon.

Compsobuthus weneri (Birula, 1908); Kinzelbach, 1985; El-Hennawy, 1992: 124 Lebanon; Fet & Lowe, 2000*: 128, 129 Lebanon with very important notes in p.129.

*1. *Buthus acutecarinatus judaicus* BIRULA, 1905 IS A SENIOR SYNONYM OF *Buthus acutecarinatus weneri* BIRULA, 1908. HOWEVER, THE FORMER NAME IS ALSO A JUNIOR PRIMARY HOMONYM OF *Buthus judaicus* SIMON, 1872 (= *Hottentotta judaicus*) (ARTICLE 53 OF THE CODE). THEREFORE, THE NAME *Buthus acutecarinatus judaicus* BIRULA, 1905 IS PERMANENTLY INVALID (ARTICLE 52B) AND HAS TO BE REPLACED BY THE NEXT AVAILABLE JUNIOR SYNONYM WHICH IS *Buthus acutecarinatus weneri* BIRULA, 1908. CORRESPONDINGLY, THE SUBSPECIES INHABITING ISRAEL, JORDAN, AND LEBANON SHOULD BE CALLED *Compsobuthus weneri schmiedeknehti* (VACHON, 1949) (FET, 1997B: 246).

2. THE TYPE LOCALITY OF BIRULA'S SPECIMENS OF *Buthus acutecarinatus judaicus* WAS NOT PUBLISHED; LEVY & AMITAI (1980: 67) GIVE IT AS JERUSALEM WHICH IS INCORRECT. ORIGINAL SYNTYPE LABELS IN ZISP REFER TO JORDAN AND LEBANON.

3. K. KRAEPELIN LABELED SPECIMENS FROM NAZARETH IN MNHN AS *Buthus schmiedeknehti* BUT NEVER PUBLISHED THIS NAME (VACHON, 1949A: 98; LEVY & AMITAI, 1980: 62). IT WAS PUBLISHED, HOWEVER, AS *Compsobuthus schmiedeknehti* WITH A VERY BRIEF (TWO-LINE) DIAGNOSIS BY VACHON (1949A), AND REPEATED IN VACHON (1952D).

Compsobuthus weneri judaicus (Birula, 1905); Vachon, 1966: 211 Lebanon; (= *schmiedeknehti* Vachon, 1949) Levy *et al.*, 1973: 114 Lebanon; Levy & Amitai, 1980: 60 *Compsobuthus weneri judaicus* (Birula, 1905) (= *C. schmiedeknehti* Vachon, 1949) Central and northern Israel, Lebanon, 68 Lebanon: The Muséum National, Paris, has a female from Ba'albek - leg. Kerville, 1911, wrongly identified by Simon as *B. gibbosus*; El-Hennawy, 1992: 124 Lebanon.

Compsobuthus weneri schmiedeknehti Vachon, 1949; Fet & Lowe, 2000: 129, 130 Lebanon [*Buthus acutecarinatus judaicus* Birula, 1905. Syntypes: (among them) 4 specimens (ZISP 648), near Beirut, Lebanon.]

Genus ***Hottentotta*** Birula, 1908

Hottentotta judaicus (Simon, 1872)

Buthus judaicus Simon, 1872; Simon, 1884: 191 Beirut, Lebanon.

Buthotus judaicus (Simon, 1872); Sammak, 1963; Vachon, 1966: 210; Levy & Amitai, 1980: 59, Lebanon: Beirut; new record from the Muséum National, Paris (Dahr el Ain); the British Museum has specimens from Amiyun and the Hebrew University has specimens from Sin-el-fil and Kariye; Kinzelbach, 1985; El-Hennawy, 1992: 116 Lebanon. Levy & Amitai, 1980: 54 Beirut; Dahr el Ain; Amiyun; Sin-el-fil; Kariye, Lebanon.

Hottentotta judaicus (Simon, 1872); Fet & Lowe, 2000: 140, 141 Lebanon.

Genus *Leiurus* Ehrenberg, 1828

Leiurus quinquestriatus hebraeus (Birula, 1908)

Leiurus quinquestriatus (Hemprich & Ehrenberg, 1829); Vachon, 1966: 211; Kinzelbach, 1985; El-Hennawy, 1992: 126 Lebanon.

Leiurus quinquestriatus hebraeus (Birula, 1908); Levy & Amitai, 1980: 51, Lebanon: the Muséum National, Paris, houses a specimen from El Kah, in the north; El-Hennawy, 1992: 126 Lebanon; Fet & Lowe, 2000: 156, 157 Lebanon.

Genus *Mesobuthus* Vachon, 1950

Mesobuthus nigrocinctus (Ehrenberg, 1828)

Buthus nigrocinctus Hemp. et Ehr.; Simon, 1884: 191 1 juvenile from Beirut, Lebanon.

Mesobuthus gibbosus (Brullé, 1832); Vachon, 1966: 213; Kinzelbach, 1985; El-Hennawy, 1992: 128; Fet & Lowe, 2000*: 176, 177 Lebanon.

* *Androctonus* (*Prionurus*) *nigrocinctus* Ehrenberg in Hemprich & Ehrenberg, 1828. Holotype: juv. (ZMB 139; damaged), mountains near coast at Beirut, Lebanon.] with important note on nomenclature in p.177.

Mesobuthus nigrocinctus (Ehrenberg, 1828); Fet *et al.*, 2001: 293. [Material Examined. Lebanon: "mountains near Beirut", 1824, F.W. Hemprich and C.G. Ehrenberg (holotype, 1 juv., ZMB 139). Distribution. Known only from the Anti-Lebanon range in Lebanon and Israel.

Genus *Orthochirus* Karsch, 1891

Orthochirus scrobiculosus (Grube, 1873)

Orthochirus innesi Simon, 1910; Vachon, 1966: 213; Kinzelbach, 1985; El-Hennawy, 1992: 129 Lebanon.

Orthochirus scrobiculosus (Grube, 1873); Fet & Lowe, 2000: 196, 197 Lebanon.

Family **Scorpionidae** Latreille, 1802

Genus *Nebo* Simon, 1878

Nebo hierichonticus (Simon, 1872)

Nebo hierichonticus (Simon, 1872); Levy & Amitai, 1980: 122 Map 9, *N. hierichonticus* is recorded near the borders between Israel and Lebanon; Kinzelbach, 1985; El-Hennawy, 1992: 134; Sissom & Fet, 2000: 353 Lebanon [Family Diplocentridae Karsch, 1880].

Genus *Scorpio* Linnaeus, 1758

Scorpio maurus fuscus (Ehrenberg, 1829)

Scorpio maurus Linné, 1758; Sammak, 1963; Vachon, 1966: 215; El-Hennawy, 1992: 139 Lebanon.

Scorpio maurus berytensis (Simon, 1884) (= *Heterometrus maurus* var. *berytensis* Simon, 1884: 191-192; near Beirut and at Nahr-el-Kelb, Lebanon.); Birula, 1910: 139 *Heterometrus maurus berytensis* E. Simon – "aux environs de Beïrut et aux Nahr-el-Kelb"; El-Hennawy, 1992: 139 Lebanon.

Scorpio maurus fuscus (Hemprich & Ehrenberg, 1829) (= *Buthus (Heterometrus) palmatus fuscus* Hemprich & Ehrenberg, 1829: 116: Beirut, Lebanon.); Birula, 1910: 139 *Buthus (Heterometrus) palmatus fuscus* Hemprich et Ehrenberg – "in Syriae littore ad montis Libani radicem prope Berytum"; Birula, 1910: 176, 177 *Scorpio maurus fuscus* (Hemprich und Ehrenberg) (Libanon - 9.IV.1904 und Ain Zahalte - 19.IV.1904) from the collection of Prof. J. Sahlberg. Beiruth und Nahr-el-Kelb (E. Simon, 1884, sub var. *berytensis*, leg. Ab. David); Levy & Amitai, 1980**: 114 Lebanon: 'En Zahalte, Beirut, Nahr-el-Kalb.; Kinzelbach, 1985; El-Hennawy, 1992: 139, 140 Lebanon.

Scorpio maurus fuscus (Ehrenberg, 1829); Fet, 2000*: 476, 477 Lebanon.

**Buthus (Heterometrus) palmatus fuscus* Ehrenberg in Hemprich & Ehrenberg, 1829: 352. Types lost; mountains near Beirut, Lebanon.

SYNONYMS

Heterometrus palmatus var. *minor* Simon, 1872a: 258 (synonymized by Pocock, 1900a: 363). SYNTYPES: (sex unknown), (MNHN), Lebanon.

Heterometrus maurus var. *berytensis* Simon, 1884b: 192 (synonymized by Birula, 1910: 176). SYNTYPES: ♂♀ (MNHN), Beirut, Nahr el-Kalb, Lebanon.]

**Levy & Amitai, 1980: 104, 112

Buthus (Heterometrus) palmatus fuscus Hemprich & Ehrenberg, 1829: 116 (= *Scorpio maurus fuscus*) Type Locality: Beirut, Lebanon.

Heterometrus palmatus var. *minor* Simon, 1872, 2: 258 (= *Scorpio maurus fuscus*) Type Locality: Lebanon.

Heterometrus maurus var. *berytensis* Simon, 1884, (6) 4: 192 (= *Scorpio maurus fuscus*) Type Locality: Beirut, Nahr el-Kalb, Lebanon; type in the Muséum National, Paris.

List of Lebanese Scorpions

Family **Buthidae** C.L. Koch, 1837

Androctonus amoreuxi levyi Fet, 1997

Androctonus bicolor bicolor Ehrenberg, 1828

Androctonus crassicauda (Olivier, 1807)

Buthacus leptochelys leptochelys (Ehrenberg, 1829)

Buthus occitanus (Amoreux, 1789)

Compsobuthus wernerii schmiedeknehti (VACHON, 1949)

Hottentotta judaicus (Simon, 1872)

Leiurus quinquestriatus hebraeus (Birula, 1908)

Mesobuthus nigrocinctus (Ehrenberg, 1828)

Orthochirus scrobiculosus (Grube, 1873)

Family **Scorpionidae** Latreille, 1802

Nebo hierichonticus (Simon, 1872)

Scorpio maurus fuscus (Ehrenberg, 1829)

2 Families, 10 Genera, 12 Species

Key to Species *

1. Sternum subpentagonal; anterior margin of carapace with distinct notch; Pedipalp patella with ventral trichobothria Family **Scorpionidae** ... 2

-. Sternum subtriangular; anterior margin of carapace not conspicuously notched; Pedipalp patella without ventral trichobothria Family **Buthidae** ... 3

2. Telson with distinct subaculear tubercle *Nebo hierichonticus*

-. Subaculear tubercle absent *Scorpio maurus fuscus*

3. Carapace, in lateral view, with a distinct downward slope from median eyes to anterior margin; Small scorpions (usually less than 30 mm long); Metasomal segment V punctuate ***Orthochirus scrobiculosus***
 -. Carapace, in lateral view, with entire dorsal surface horizontal, or nearly so (possibly with slight anterior downward slope); Size variable 4
4. Mesosomal tergites I and II with five distinct carinae ***Leiurus quinquestriatus***
 -. Anterior tergites without carinae, or with 1 to 3 carinae 5
5. Carapace smooth, lacking distinct carinae ***Buthacus leptochelys***
 -. Carapace with distinct carinae 6
6. 4 granules on pedipalp-chela movable finger, just proximal to terminal denticle 7
 -. 3 granules on pedipalp-chela movable finger, just proximal to terminal denticle 9
7. Central lateral and posterior lateral carapacial carinae joined, forming a continuous linear series of granules to posterior margin ***Compsobuthus wernerii schmiedeknechti***
 -. Central lateral and posterior lateral carapacial carinae not joined as above, usually separated by a small gap, with central lateral carinae continuing distally beyond origin of posterior laterals 8
8. Ventrolateral carinae of metasomal segment V with posterior granules enlarged, often lobate; Central, lateral, and posterior median carapacial carinae joined, forming a lyre-shaped configuration ***Mesobuthus nigrocinctus***
 -. Ventrolateral carinae of metasomal segment V with all granules more or less equal in size, never lobate; Carapacial carinae not forming a lyre-shaped configuration ***Hottentotta judaicus***
9. Central, lateral, and posterior median carapacial carinae joined, forming a lyre-shaped configuration; Metasoma with all segments more or less equal in width and depth; Metasomal segment IV with weakly developed dorsolateral carinae ***Buthus occitanus***
 -. Central, lateral, and posterior median carapacial carinae not joined as above; Metasomal segments robust, increasing in width and depth posteriorly; Metasomal segment IV with well-developed granulate dorsolateral carinae ***Androctonus*** ... 10
10. Third segment of metasoma longer than wide ***Androctonus amoreuxi***
 -. Third segment of metasoma wider than long 11
11. Hands of pedipalps broad and stout ***Androctonus crassicauda***
 -. Hands of pedipalps slender ***Androctonus bicolor***
-
- * Modified from Sissom (1990), El-Hennawy (1992) and Levy & Amitai (1980).

III. Pseudoscorpions of Lebanon *

Order Pseudoscorpiones de Geer, 1778

Suborder **Iocheirata**
 Superfamily **Cheliferoidea**
 Family **Cheliferidae** Risso, 1826
 Subfamily **Cheliferinae**

Genus ***Dactylochelifer*** Beier, 1932

Dactylochelifer kussariensis (Daday, 1889)

Dactylochelifer kussariensis; Beier, 1955: 219, 3♂♂, 2 km south of Hermel, Syria, under stones, 7.3.1952. (Hermel in Lebanon)

Dactylochelifer syriacus Beier, 1955 Only from Lebanon and Syria, N. of Himata (Type Locality).

Dactylochelifer syriacus nov.spec. Beier, 1955: 219, Paratype: 1♂ tritonymph, Lebanon, cedar forest, 1900 m, 2.5.1953.

Genus ***Hysterochelifer*** Chamberlin, 1932

Hysterochelifer cyprius (Beier, 1929)

Family **Chernetidae** Menge, 1855

Subfamily **Lamprochernetinae**

Genus ***Pselaphochernes*** Beier, 1932

Pselaphochernes scorpioides (Hermann, 1804)

Pselaphochernes scorpioides; Beier, 1955: 216, 1♀, Wadi Jahhuam, NW Tripoli-Prov., 30.-31.7.1952; 1♀, 1 deutonymph, Hammanha, Lebanon, 1900 m, under stones and wood.

Superfamily **Garypoidea**

Family **Garypinidae** Daday, 1888

Genus ***Garypinus*** Daday, 1888

Garypinus asper Beier, 1955 Lebanon, Ouadi el Fouar [33°59'N, 35°35'E] (as Anteljas-Fluss), *Mont-Liban* (Type Locality).

Garypinus asper nov.spec. Beier, 1955: 215-216, Types: 1♂, 1♀, Syria, Antelias River, under stones, 11.9.1952 (American Museum Beirut [American University Beirut] and Vienna Museum [NHMW]).

Family **Olpiidae** Banks, 1895

Subfamily **Olpiinae**

Genus ***Calocheiridius*** Beier & Turk, 1952

Calocheiridius libanoticus Beier, 1955 Lebanon, Vi Baht Atahe (Type Locality).

Calocheiridius libanoticus nov.spec. Beier, 1955: 213-215, Types: 1♂, 1♀, Vi Baht Atahe, Lebanon, under stone, 7.-10.4.1953 (American Museum Beirut and Vienna Museum). Paratype: 1 tritonymph, Min Zahle, cedar forest, 1700-1800 m, 15.-17.7.1952 (American Museum Beirut).

Superfamily **Neobisioidea**

Family **Neobisiidae** Chamberlin, 1930

Subfamily **Neobisiinae**

Genus ***Neobisium*** Chamberlin, 1930

Neobisium (Neobisium) validum (L. Koch, 1873)

Neobisium (N.) validum; Beier, 1955: 212, 1♂, 1♀, 1 protonymph, Chamlane, oaks and pines; 1♂, 10 deuto- and tritonymphs, Antelias, river bed, under stones, 11.9.1952.

Family **Syarinidae** Chamberlin, 1930

Subfamily **Chitrellinae**

Genus ***Microcreagrina*** Beier, 1961

Microcreagrina hispanica (Ellingsen, 1910)

Suborder **Epiocheirata**

Superfamily **Chthonioidea**

Family **Chthoniidae** Daday, 1888

Genus **Chthonius** C.L. Koch, 1843

Chthonius (Chthonius) jonicus Beier, 1931

Chthonius (Neochthonius) jonicus; Beier, 1955: 212, 1♀, Lebanon, from a tree hollow, 1.2.1953; probably belong to this species: 1 protonymph, Lebanon, Dimane, Bet Hasroun-Hadeth, 6.8.1953, and 1 protonymph, Wadi Jahhuam, NW Tripoli-Prov., 30.-31.7.1952.

Chthonius (Ephippiochthonius) tetrachelatus (Preyssler, 1790)

Chthonius (Ephippiochthonius) tetrachelatus; Beier, 1955: 212, 1♂, 1 tritonymphe, Wadi Jahhuam, NW Tripoli-Prov., 30.-31.7.1952; 2♂♂, Lebanon, from a tree hollow, 1.2.1953; 1♂, Ain Zahlta, cedar forest, 23.11.1952; 1 tritonymphe, Antelias, riverbed, under stones, 11.9.1952; 4 tritonymphs, Beit-Ed-Dina, pine grove, 28.11.1953.

* This list of Lebanese pseudoscorpions is extracted from Harvey (2011) in addition to Beier (1955).

List of Lebanese Pseudoscorpions
Order Pseudoscorpiones

Suborder **Iocheirata**

Superfamily **Cheliferoidea**

Family **Cheliferidae** Risso, 1826

Dactylochelifer kussariensis (Daday, 1889)

Dactylochelifer syriacus Beier, 1955

Hysterochelifer cyprius (Beier, 1929)

Family **Chernetidae** Menge, 1855

Pselaphochernes scorpioides (Hermann, 1804)

Superfamily **Garypoidea**

Family **Garypinidae** Daday, 1888

Garypinus asper Beier, 1955

Family **Olpiidae** Banks, 1895

Calocheiridius libanoticus Beier, 1955

Superfamily **Neobisioidea**

Family **Neobisiidae** Chamberlin, 1930

Neobisium (Neobisium) validum (L. Koch, 1873)

Family **Syarinidae** Chamberlin, 1930

Microcreagrina hispanica (Ellingsen, 1910)

Suborder **Epiocheirata**

Superfamily **Chthonioidea**

Family **Chthoniidae** Daday, 1888

Chthonius (Chthonius) jonicus Beier, 1931

Chthonius (Ephippiochthonius) tetrachelatus (Preyssler, 1790)

7 Families, 8 Genera, 10 species

Key to Superfamilies and Families *

1. Tarsi of legs 1 and 2 consist of one segment each while tarsi of legs 3 and 4 consist of two segments each (i.e. Heterotarsate); Chelicerae large, sometimes 2/3 the carapace length; Eyes usually 4 or absent) Superfamily **Chthonioidea**, Family **Chthoniidae**
 -. Tarsi of legs 1-4 consist of one segment each; Chelicerae small, not more than 1/3 the carapace length; Eyes 2 or absent Superfamily **Cheliferoidea** 2
 --. Tarsi of legs 1-4 consist of two segments each; Chelicerae moderately large, about 1/2 the carapace length or shorter; Eyes usually 4, may be 2 or absent 3

2. Venom apparatus developed only in the movable finger, vestigial or absent in the fixed finger; Fingers of palpal chela usually have accessory teeth, located externally and internally to the marginal row Family **Chernetidae**
 -. Venom apparatus well developed in both fingers of the palpal chela; Fingers of palpal chela without accessory teeth Family **Cheliferidae**

3. Carapace usually rectangular or square; Chelicerae about 1/2 the carapace length; Eyes often 4, but may be 2 or absent; Abdominal tergites and sternites undivided Superfamily **Neobisioidea** 4
 -. Carapace may be rectangular, or more or less triangular; Chelicerae shorter than 1/2 the carapace length; Eyes usually 4; Abdominal tergites and sternites may be divided or undivided Superfamily **Garypoidea** 5

4. Carapace rectangular or square, and often bears an epistome on the anterior margin; Abdomen pleural membranes distinctly granulated; Leg 4 line of articulation between the basifemur and telofemur is perpendicular to the long axis of the femur Family **Neobisiidae**
 -. Carapace rectangular; Abdomen pleural membranes may be granulated, but usually are smoothly and longitudinally striated; Leg 4 line of articulation between the basifemur and telofemur is at least slightly oblique to the long axis of the femur Family **Syarinidae**

5. Carapace mostly rectangular; Body surfaces usually smooth; Setae of the body and appendages usually long and acuminate; Abdomen usually long and oval, pleural membranes usually smoothly, longitudinally striated, tergites and sternites either divided or undivided; Legs femora 3 and 4 short and stout Family **Olpiidae**
 -. Carapace distinctly triangular; Body surfaces usually granulated; Setae of the body and appendages often toothed, but small and inconspicuous; Abdomen broad, pleural membranes granulated or rugose, and often bear small setae, tergites and sternites divided; Legs femora 3 and 4 moderately slender Family **Garypinidae**

* Modified from El-Hennawy (1988).

IV. Harvestmen of Lebanon

The study of harvestmen of Lebanon began with the description of a female specimen, collected by Charles de la Brûlerie, as a new species named *Dasylobus eremita* by Eugène Simon (1878b). The same author described *Phalangium hebraicum* [now *Zacheus hebraicus*] as another new species from Beïrout and Antoura (Simon, 1884).

Sørensen (1911) described three new species from Lebanon collected by Henri Gadeau de Kerville: *Phalangium coxipunctum* from Broumana, Beit-Méri, and Baalbek, *Phalangium conigerum* from Doummar, Anti-Lebanon, and *Leiobunum albigenum* from Beit-Méri. The first species was transferred to genus *Opilio* by Roewer (1923).

Staręga (1973) described a new species collected from Beirut by P. Bovier-Lapierre and named it *Graecophalangium punicum*. Also, he identified specimens collected from different localities in Lebanon and recorded: „*Nemastoma*” *haasi* (Roewer, 1953) [now *Mediostoma haasi* due to Snegovaya (2008)], *Phalangium savignyi*, *Metaphalangium propinquum* [now *M. cirtanum* due to Staręga (1984)], *Zacheus hebraicus*, *Opilio coxipunctus*, *Leiobunum seriatum* (a species described by Simon (1878b) from Asia Minor: Latakiah [now Syria]).

The following list of Lebanese harvestmen follows Kury (2002 onwards) and its references mainly depend on Kury (2010). It includes 10 species of 8 genera that belong to 3 families.

Order Opiliones Sundevall, 1833

Dyspnoi Hansen & Sørensen, 1904

Superfamily **Troguloidea** Sundevall, 1833

Family **Nemastomatidae** Simon, 1872

Subfamily **Nemastomatinae** Simon, 1872

Genus ***Mediostoma*** Kratochvíl & Miller, 1958

Mediostoma haasi (Roewer, 1953)

„*Nemastoma*” *haasi* (Roewer, 1953). Staręga (1973: 132) Lebanon: Beirut, park in the American University, vegetated lime gravels, 12.V.1961, leg. A. Riedel - 1♂ (IZPAN).

Mitostoma haasi Roewer, 1953: 209–210, figs. 6a–c. Snegovaya (2008: 272).

“*Nemastoma*” *haasi*: Staręga, 1973: 132–133, figs. 7–9. Snegovaya (2008: 272). Lebanon (Roewer, 1953; Staręga, 1973).

Eupnoi Hansen & Sørensen, 1904

Superfamily **Phalangioidae** Latreille, 1802

Family **Phalangiidae** Latreille, 1802

Subfamily **Opilioninae** C.L.Koch, 1839

Genus ***Opilio*** Herbst, 1798

Opilio coxipunctus (Sørensen, 1911)

Phalangium coxipunctum Sørensen (1911: 211–213). 2♂ 2♀ New species from Broumana, Beit-Méri, and Baalbek, Lebanon.

Opilio coxipunctus (Sørensen, 1912). Roewer (1923: 772) Syrien: Libanon (Beit-Meri, Broumana, Baalbek) – 2♂, 2♀.

Opilio coxipunctus (Sørensen, 1912). Staręga (1967: 59). Lebanon (terra typica)

Opilio coxipunctus (Sørensen, 1912). Staręga (1973: 142). Lebanon: Beirut, park in the American University, vegetated lime gravels, 12.V.1961, leg. A. Riedel - 1 ♂, 2 ♀♀, 1 juv. (IZPAN); Tal Nahr el Kelb at Beirut, among limestones, II.V.1961, leg. A. Riedel - 1 juv. (IZPAN); Tripoli (Tarābulus esh Shām), vegetated limestones, 15.V.1961, leg. A. Riedel - 1 ♂, 4 ♀♀ (IZPAN).

Opilio coxipunctus (Sørensen, 1912). Snegovaya (2008: 277). Lebanon (Staręga, 1973).

Subfamily **Phalangiinae** Latreille, 1802

Genus ***Dasylobus*** Simon, 1878

Dasylobus eremita Simon, 1878

Dasylobus eremita Simon (1878b: CCXX). New species from Lebanon (Ch. de la Brûlerie) ♀ only.

Dasylobus eremita Simon, 1878. Simon (1884: 192) Akbès. [nord d'Antioche] Cette espèce avait été découverte dans le Liban par feu Charles de la Brûlerie.

Genus **Graecophalangium** Roewer, 1923

Graecophalangium punicum Staręga, 1973

Graecophalangium punicum Staręga (1973: 140-141). New species from Lebanon: Beirut, 1910, leg. P. Bovier-Lapierre (coll. W. Kulczyński) – 1 ♂ (Holotypus) (IZPAN).

Genus **Metaphalangium** Roewer, 1911

Metaphalangium cirtanum (C.L. Koch, 1839)

Opilio Cirtanus C.L. Koch, 1839: 35 – D. Staręga (1984: 39).

Phalangium propinquum (Lucas, 1846): 286-287 - D, t. 20, f. 4-4c. Staręga (1984: 39, syn. n.).

Metaphalangium propinquum Staręga (1973: 138). Lebanon: Beirut, 1910, leg. P. Bovier-Lapierre - 2 ♂♂, 1 ♀, 2 juv. (IZPAN).

Metaphalangium cirtanum (C.L. Koch, 1839). Staręga (1984: 39) Lebanon.

Genus **Phalangium** Linnaeus, 1758

Phalangium conigerum Sørensen, 1911

Phalangium conigerum Sørensen (1911: 213-214). One specimen. New species from Doummar, Anti-Lebanon.

Phalangium conigerum Soerensen, 1912. Roewer (1923: 746) Anti-Lebanon - 1 ♀.

Phalangium savignyi Audouin, 1825

Phalangium savignyi Staręga (1973: 133-134). Lebanon: Beirut, 1910, leg. P. Bovier-Lapierre - 2 ♂♂, 2 ♀♀, 10 juv. (IZPAN).

Phalangium savignyi Audouin, 1827. Staręga (1984: 54). Lebanon.

Phalangium savignyi Audouin, 1826. Snegovaya (2008: 273). Lebanon (Staręga, 1973).

Genus **Zachaeus** C.L.Koch, 1839

Zacheus hebraicus (Simon, 1884)

Phalangium hebraicum Simon (1884: 194-196). New species. Beirout et Antoura .

Zacheus hebraicus Staręga (1973: 142). Lebanon: Beirut, park in the American University, vegetated lime gravels, 12.V.1961, leg. A. Riedel - 1 ♂, 1 ♀ (IZPAN).

Family **Sclerosomatidae** Simon, 1879

Subfamily **Leiobuninae** Banks, 1893

Genus **Leiobunum** C.L.Koch, 1839

Leiobunum albigenum Sørensen, 1911

Liobunum albigenum Sørensen (1911: 217-219). 2 ♀ and juveniles. New species from Beit-Méri, Lebanon (new species).

Leiobunum albigenum Soerensen, 1912. Staręga (1967: 62). Lebanon.

Leiobunum seriatum Simon, 1878

Leiobunum seriatum Simon (1878b: CCXVII). New species from Asia Minor:

Latakiah [now Syria].

Leiobunum seriatum Staręga (1973: 150). Lebanon: Tripoli (Tarābulus esh Shām), vegetated limestones, 15.V.1961, leg. A. Riedel - 1 subad. ♀ (IZPAN).

List of Lebanese Harvestmen

Dyspnoi Hansen & Sørensen, 1904

Superfamily **Troguloidea** Sundevall, 1833

Family **Nemastomatidae** Simon, 1872

Subfamily **Nemastomatinae** Simon, 1872

Mediostoma haasi (Roewer, 1953)

Eupnoi Hansen & Sørensen, 1904

Superfamily **Phalangioidae** Latreille, 1802

Family **Phalangiidae** Latreille, 1802

Subfamily **Opilioninae** C.L.Koch, 1839

Opilio coxipunctus (Sørensen, 1911)

Subfamily **Phalangiinae** Latreille, 1802

Dasylobus eremita Simon, 1878

Graecophalangium punicum Staręga, 1973

Metaphalangium cirtanum (C.L. Koch, 1839)

Phalangium conigerum Sørensen, 1911

Phalangium savignyi Audouin, 1825

Zacheus hebraicus (Simon, 1884)

Family **Sclerosomatidae** Simon, 1879

Subfamily **Leiobuninae** Banks, 1893

Leiobunum albigenum Sørensen, 1911

Leiobunum seriatum Simon, 1878

3 Families, 8 Genera, 10 Species

V. Sun-Spiders of Lebanon

Order Solifugae Sundevall, 1833

Family **Galeodidae** Sundevall, 1833

Genus **Galeodes** Olivier, 1791

Galeodes arabs C.L.Koch, 1842

Galeodes arabs syriacus Kraepelin, 1899: 203; Kraepelin, 1901: 22 (as *Galeodes arabs* var. *syriaca* [sic]- Syria (Beirut) only ♀); Werner, 1902: 607 (as *Galeodes arabs syriaca* [sic]); Roewer, 1934: 532; Moritz and Fischer, 1980: 148; Harvey, 2003: 257.

Type localities: Beirut, Jabal Lubnan, Lebanon; Yafo (as Jaffa), Palestine.

Distribution: Palestine, Lebanon, Syria.

Galeodes distinctus (Roewer, 1934)

Galeodora distincta Roewer, 1934: 513; Zilch, 1946: 149; El-Hennawy, 1999: 90.

Galeodes distinctus (Roewer): Harvey, 2002: 452; Harvey, 2003: 262.

Type locality: Beirut, Jabal Lubnan, Lebanon.

Distribution: Lebanon.

- The record of a juvenile *Galeodes araneoides* Pallas, 1772 by Simon (1884): 181 from Beirut, Lebanon may belong to one of the two preceding species.

1 Family, 1 Genus, 2 Species

VI. Micro Whip-Scorpions of Lebanon

Order Palpigradi Thorell, 1888

Family **Eukoeneriidae** Petrunkevitch, 1955

Genus **Eukoeneria** Börner, 1901

Eukoeneria juberthiei Condé, 1974

Type locality: Grotte Šakkž, Chekka, *Liban-Nord*, Lebanon.

Distribution: Lebanon, Greece (Condé (1979) described two subspecies, *E. j. cytheriaca* from Grotte Spilia tou Panos, Keratea and *E. j. hellenica* from Grotte Aghia Sophia, near Mylopotamos, Attikí, Kíthira, Greece).

Eukoeneria juberthiei Condé, 1974: 57–62, figs 1a-b, 2a-b, 3a-b, 4a-b; Rowland and Sissom, 1980: 80; Condé, 1984: 136; Harvey, 2003: 155.

Eukoeneria juberthiei juberthiei Condé, 1974

Distribution: Lebanon.

Condé, 1974: 57, 58: "L'exemplaire étudié ici fut découvert en 1964 par ALOUF, jeune chercheur libanais au Laboratoire souterrain du Centre national de la Recherche scientifique, à Moulis, et m'a été soumis par l'intermédiaire de Ch. JUBERTHIE à qui cette nouvelle espèce est dédiée.

***Eukoeneria juberthiei* n. sp.**

MÂLE ADULTE. Type dans les collections du Laboratoire de Zoologie approfondie de l'Université Nancy I, monté sur deux lames dans le milieu II de Marc-André.

LIBAN. Grotte Šakkž [= grotte du Râs (ou Cap) Chekka, *Biospeologica*, LXXV, p. 363, H. COIFFAIT], petite cavité au bord de la mer au pied d'une falaise, entre Tripoli et Batroum, parcourue par un ruisseau formant des gours bien concrétionnés. Le spécimen qui flottait probablement sur l'eau d'un gour a été recueilli au cours d'une pêche à l'aide d'un filet à plancton."

Eukoeneria mirabilis (Grassi and Calandruccio, 1885)

Koenenia mirabilis Grassi and Calandruccio, 1885

Type locality: Catania, *Sicily*, Italy.

Distribution: Algeria, Australia (South Australia), Chile, Egypt, France (mainland and Corsica), Greece (mainland and Crete), Israel, Italy (mainland and Sardinia, Sicily), Madagascar, Majorca, Malta, Morocco, Portugal (mainland and Madeira), Romania, Spain (Islas Canarias), Tunisia (Harvey, 2003: 157).

Eukoeneria mirabilis Rémy, 1948: 254; Condé, 1974: 57: a small valley 11 km south-west of Beirut.

Condé (1974: 57) said in his paper on a new palpigradid found in a cave of Lebanon: "Les Palpigrades ne sont connus au Liban que par deux femelles adultes de *Eukoeneria mirabilis* Grassi que j'ai déterminées parmi des échantillons de faune endogée récoltés aux environs de Beyrouth par J. CORSET (REMY, 1948)." In his paper on the palpigradids of Egypt (Condé, 1951: 211), he reported Lebanon in the distribution of *Koenenia mirabilis*.

Rémy (1948: 254) said, about the distribution of *Koenenia mirabilis* Grassi in the Mediterranean region, "L'espèce vit également au Liban : Condé vient d'en déterminer 2 ♀ adultes, récoltées en mars 1946 par le P. Jean Corset dans un vallon situé à 11 km. au sud-ouest de Beyrouth."

1 Family, 1 Genus, 2 Species

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